



FRIDAY, JULY 19.

CONTENTS.

ILLUSTRATIONS:	PAGE.	PAGE
Locomotive Fire Extinguisher	473	TRADE CATALOGUES..... 481
Pennsylvania Railroad.....	473	GENERAL RAILROAD NEWS:
Overhead Crane System—Machine Shops, Westinghouse	474	Meetings and Announcements. 484
Electric & Mfg. Co.....	474	Personal..... 484
Improved Centre Gauge.....	477	Elections and Appointments. 484
CONTRIBUTIONS:		Old and New Roads..... 485
Train Accidents—Correction.....	471	Traffic..... 486
The Contact Between Wheel and Rail.....	471	MISCELLANEOUS:
Locomotive Tests on the Central Vermont.....	471	Technical..... 477, 482
Observations on the Warping of Timber and Lumber.....	471	The Scrap Heap..... 483
Counterbalancing the Reciprocating Parts of Locomotives.....	471	Railroad Matters in India..... 472
EDITORIALS:		Locomotive Engineering at Paris..... 474
Can a Railroad Trust be Successful.....	479	Wire Cable Welding by Electricity..... 475
Gasoline in a Week.....	479	Trains Tied Up by Failure of Wires..... 476
June Accidents.....	479	Association of Accounting Officers..... 477
Hungarian Passenger Rates.....	480	The Senate Committee Hearing on Canadian Competition..... 477
EDITORIAL NOTES.....	478, 480	Train Accidents in June..... 481
NEW PUBLICATIONS.....	481	The Boston & Maine Freight Office at Worcester, Mass..... 482

Contributions.

Train Accidents—Correction.

ST. LOUIS, ARKANSAS & TEXAS RAILWAY, TEXARKANA, Texas, July 2, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I notice in your issue of June 28, under head of train accidents in May caused by "Negligence in Operating," that on the 30th this company had an accident near Helena, Ark. Please note that this road does not reach Helena and had no accident on that date.

J. T. BURLINGAME.

The Contact Between Wheel and Rail.

LEHIGH UNIVERSITY, BETHLEHEM, Pa., July 15, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The form of wheel tread described in your last issue as designed by Mr. Barr, and adopted as a standard on the Chicago, Milwaukee & St. Paul, does not appear to be in accordance with sound theory, if the main reason be "for the purpose of distributing the pressure over as large an area as practicable." This was the controlling reason, as I understand it, which led to the design of the Lehigh Valley rail, only that the contact along the side and upper corner of the rail was regarded rather than that upon the top. But the reports of the committee of the American Society of Civil Engineers on this subject show quite satisfactorily that such a high degree of contact is undesirable, and that the complete contact along the top which would follow from Mr. Whittemore's cylindrical wheel and flat-topped rail would also probably be inadvisable. The form of wheel tread introduced by Mr. Barr is hence in opposition to the conclusions of that committee, and these conclusions appear to represent the best practice as far as existing statistics can testify.

The reason why a large area of contact is undesirable both on the top and along the corner and side of the rail seems to me to be this: The coefficient of sliding friction is, as well shown by modern experiments, not independent of the normal pressure, but for the same area of surface it decreases when the pressure increases, or for the same total pressure it decreases when the area diminishes (see an article on Conti's laws of sliding friction in the *Railroad Gazette* of June 14, 1889). In other words, the amount of friction, and hence the wear, between two surfaces decreases when the pressure per square inch increases. Now, on the side of the rail the wear is almost entirely caused by sliding friction, and hence to make the wear small the area of contact should be small.

On the top of the rail the wear is caused by the abrasion due to the rolling wheel and to the sliding friction due to the lateral play between wheel and rail; the first of these causes requires a large area of contact and the second a small area of contact. If the effects of these causes were quantitatively known, the proper area of contact might be perhaps computed, but at present nothing appears to be determinable except that the area should lie between "large" and "small," and hence should not be "as large as practicable."

MANSFIELD MERRIMAN.

Locomotive Tests on the Central Vermont.

FRANKFORD, N. Y., July 15, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In reference to the interesting and carefully worked out tests on the Central Vermont locomotive given in your issue of July 12, there are one or two points to which I should like to call attention.

The low initial pressure compared with boiler pressure is there attributed to the small throttle opening, but is more probably due to the small dry pipe (4½ in. diameter). For an 18-in. cylinder the usual practice is 6 in., and in one case I know of a 7-in. pipe being used, with apparently good results. The area of the steam ports is also small (14 in. by 1½ in.). An 18-in. cylinder should be designed with ports 16 in. long, the width varying to suit the lap and travel of the valve. It would be interesting in all such experiments to compare the

actual M. E. P. with the theoretical calculated from the formula:

$$M. E. P. = \frac{1 + \text{hyp. log } r}{r} P$$

where r = ratio of expansion. P = initial pressure.

as this gives a convenient way of comparing valve gears.

The percentage of boiler pressure realized as M. E. P. is low, as would of course follow from the fall in initial pressure. At the highest speed given, 51 miles per hour, card No. 1, it is 16½ per cent. at 6 in. cut-off. I have taken cards at 60 miles per hour, 6½ in. cut-off, where it is 32 per cent. Your criticism as to the lack of data concerning clearance is very true, as a clearance of 10 per cent. (a common figure for locomotives) makes a great difference in working out the diagrams.

J. R. S.

WATERTOWN, N. Y., July 15, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the editorial note last week referring to my tests on Central Vermont locomotive, the question of duration was brought up. The types in both my report and the editorial note make me say "the duration of the test has been taken at the time when throttle valve was open." It should have read "as the time when throttle valve was open."

As was inferred, the duration given in Table No. 2 means only the time the throttle was open, including switching at terminals, and therefore is the total time that steam was being used in the cylinders. The total time from starting to hauling of fire has not been taken into account, for, owing to the time required to start the fire, and long waits during the runs, this figure cannot, in our estimation, be used to any purpose. For instance, on Sept. 7 the fire was started at 4 a. m. and hauled at 2:30 p. m., making a total duration of 10½ hours, while the throttle was open only 4 hrs. 50 min. out of that time. The engine was on the road 7½ hours, and of this 2½ hours are for stops, while the remainder of the total duration is for quietly raising steam before starting out.

During the raising of steam, and also during stops, no steam is used or supposed to escape, and but little did, through the safety valve; so it seems that all the coal was used to generate all the water into steam of the average pressure, to be consumed during the 4 hrs. 50 min. that the throttle was open. Therefore, it seems to me that any time taken for duration, outside of the time the throttle is open, must be arbitrarily assumed, and results figured from this assumed time can have no certain value. It will be further noticed that results figured from the "throttle duration," as given in my report, are the least favorable to the engine, for it must be allowed that the duration cannot be shorter than the time steam is being used in the cylinders, and any results depending upon the duration will be less than shown in my tables, if the time is taken longer than the throttle duration. The evaporation per hour will, of course, be changed as the duration is taken longer or shorter, but the evaporation per pound of fuel will remain unchanged.

The percentage of clearance volume, while not appearing in the data, is practically 7 per cent. of the cylinder volume, and was so taken in all the calculations for steam consumption from the diagrams. The valves and piston packing were not especially tested for leakage, as the engine was in excellent condition, and no leakage affecting results was suspected or indicated. The proportion of feed water accounted for by the cards, to actual consumption, agrees well with locomotive and stationary engine tests with which I am familiar. In verification of this in the tests conducted by Geo. H. Barrus on the Boston & Albany, and published in the *Gazette*, Nov. 10, 1882, results from three engines give proportion of feed accounted for by cards at cut-off, to be 76, 79 and 84 per cent. of actual consumption.

From Corliss engine tests before me, I find this same proportion in five tests to be 81, 78, 73, 75, 68 and 70 per cent. of actual consumption.

I have, therefore, no good reason to question the results from loco. 88, C. V. R. R., given in my report.

H. G. MANNING.

Observations on the Warping of Timber and Lumber.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It is generally believed that the cause of a board's warping is the swelling of the fibres on either side, due to the wetting of that side. While in extreme cases this is true, most lumber when laid away where it is protected from the possibility of being wet on either side, will absorb moisture from the air as equally on both sides as the nature of the material will permit; and yet it has been found that such boards will become at least slightly warped. In the case of thin boards the curve is harmless, being easily corrected, but in the case of thick boards, or wide, thick timber, the warp is incurable.

Never having seen any discussion of the subject, the writer has been led to make a number of observations on the direction of the warp. It is evident that, in sawing logs, only one board can be cut containing the centre of the tree. Examination of the end of that board will show a small ring at the centre, with other rings and parts of rings, until near the edges of the board the rings of growth will appear as lines passing squarely across the board, especially if the tree was of large diameter. If the board was cut some distance from the centre of the tree the rings will appear as curved lines entering one side of the board, passing partly or entirely across the end and curving back to the same side, showing which side of the board was toward the centre of

the tree before cutting. For convenience we will call this the inside of the board.

Examination of the ends of a great number of pieces, more or less warped from one cause or another, has shown, without exception, that the curve due to the warping was opposite to the curve of the rings of growth. That is, if two warped boards are placed with the concave sides together, examination of the ends will show the curves of the rings of growth with their convex sides together. The rings on the two boards will be closer together at the centre than at the edges of the boards. This would appear to show that the fibres on the inside of a board either absorb moisture more freely, or swell more with the same amount of moisture, than the fibres of the outside; the result being that the absorption of moisture by timber tends to straighten out the curves of the rings of growth. We may conclude from this that warping may be prevented to a large extent, especially where it is desirable to avoid crossing the grain, by gluing the boards together with their outside faces in contact, special care being taken to avoid placing an inside face in contact with an outside face. It is best to place concave faces together, so the tendency to separate will be greatest at the centre, rather than at the edge.

We would also conclude that, when boards are to be veneered on one side only, that the veneer should be placed on the "inside" of the board, so that the "draw" of the shrinking veneer will tend to counteract the warp. I have failed to discover if there is any especial rule among veneer layers in selecting the side of the board in veneering.

C. J. BATES.

Counterbalancing the Reciprocating Parts of Locomotives.

SYDNEY, New South Wales, June 10, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In answer to your query on the above subject in the *Railroad Gazette* of April 12, which reached me last mail, I can only say that I have never in my own practice had any difficulty with locomotives from either excess or deficiency of counterbalance weight in the wheels. I have generally endeavored to entirely balance the revolving parts and about one-quarter of the reciprocating parts. On one class of express engines which I was especially desirous should run smoothly at high speeds, I settled the exact weight of the counter weights in the wheels by actual experiment on the first engine of the class.

The engine had 18 by 24 in. cylinders, a single pair of 7 ft. 6 in. drivers, and was outside connected. The hind wheels were 48 in. diameter on tread, and the front end of the engine was carried on a four-wheeled Adams truck of the pattern very generally used in England. The engine being finished in the maker's shop was suspended at the front end, just clear of the rails, from an overhead traveling crane. The hind wheels rested on the rails, and were blocked to check fore and aft motion. Steam being got up, the drivers revolved and the motion of the front bumper or buffer beam was recorded by a metallic pencil (lead, German silver or pewter) on a piece of indicator card securely fastened to a pedestal resting on solid ground. The engine was first tried with a sufficient weight of counterbalance to just balance the revolving parts, the amount having been previously ascertained by calculation. It was found that when steam was shut off the wheels would stop in any position, showing that the revolving parts were sufficiently balanced. The motion of the bumper beam was, however, more than I considered desirable. I therefore added weights until the motion was smooth and the diagram made on the card was small and regular, being nearly circular and about ¼ in. diameter when the engine was running at a speed corresponding to 45 miles per hour. When steam was shut off the wheels invariably stopped with the balance weights at the bottom, showing that the counter weights considerably overbalanced the revolving parts, and therefore partly balanced the reciprocating parts. The temporary balance weights were then taken off and weighed, and the permanent balance weights were made equal to them in moment.

Twenty of these engines have been running ever since, ten for 10 years and ten for 7 years, with very satisfactory results. I can, therefore, bear testimony that the experimental method of ascertaining the amount of counterweights required is satisfactory.

I would, however, point out that a given diameter of driving wheel has a certain maximum speed, beyond which it cannot be satisfactorily balanced. I have often seen instances of freight engines on trial trips, when running light at high speeds, having a considerable fore and aft motion. This was due to the reciprocating parts running faster than the speed for which the engine was designed. As their momentum increases as the square of their speed, a small increase in speed often produces marked effects, and freight engines with a violent fore and aft motion at 40 miles per hour will run very smoothly at their proper maximum speed, in service, 30 miles per hour.

This part of the question has been somewhat overlooked in American practice, where smaller driving wheels are used for a given maximum speed than in any other part of the world. In England and France about 78 in. to 84 in. is the general practice for express passenger engines, and trials of smaller wheels for speeds of 60 miles per hour have not been satisfactory.

It seems probable that a piston speed of about 1,000 ft. per minute is about as much as can be used without the momentum of the reciprocating parts becoming a serious disturbing element. At 60 miles per hour, the usual American proportions of 24-in. stroke and 69-in. wheel gives 1,168 ft.

Mr. Webb's compound gives 1,076 ft. My 7 ft. 6 in. wheel gives 896 ft.

Any attempt to balance reciprocating parts perfectly by revolving weights is chimerical, as the balance weights have a constant velocity and the reciprocating parts a varying velocity, coming to a state of rest twice in every revolution. A compromise that will work fairly well in practice is all we can hope for, and I would therefore favor somewhat larger wheels for the continuous high speeds which are now rendered possible by the improved roadbed and signals on the main stems of the best roads. The piston speed could thus be reduced and a partial balancing of the reciprocating parts would be possible.

I think some accurate particulars of the weights of revolving and reciprocating parts and balance weights would throw some light on the cases which you refer to, in which the permanent way was damaged. I cannot help thinking that some clerical mistake must have been made in computing the weights, and that possibly the weights exceeded the amount necessary to balance the reciprocating parts at a high speed. This, in combination with excessive speed, seems the probable cause of the mischief.

If, as you state, the wheel guard was cut by the wheel, owing to the excessive balance weights, the centrifugal force of the balance weights must have been considerably greater than the normal adhesion weight of the drivers, for it must not only have lifted the wheels off the road, but must have in addition compressed the springs to the fullest extent, which means several tons in addition. In fact, it is a clear case of an engine lifting itself by its boot straps.

Engines will, however, jump about to an incredible extent when boxes, etc., are slack, the road is rough and the speed high, and few engines that have run some time are without marks, showing an occasional excessive movement of the wheels, both laterally and vertically. An engine on which I fired when serving my pupilage had the marks of her truck wheels on the under side of her slide bars, though, owing to the peculiar construction of the engine, the lateral clearance was fully double the usual amount. Possibly this was caused by an excessive lurch on striking the curve at a junction through which we used to run at 40 miles per hour to make a run up a very steep but short grade. I should, therefore, be a little skeptical as to the marks on the wheel guard being wholly caused by any accurate balancing of both the reciprocating and revolving parts, as long as the engine was run at a proper speed. Some cases of damage to rails are on record from excessive balance weights, but always, I believe, in combination with undue speed.

D. H. NEALE.

Concerning this subject we are permitted to publish the following from Mr. A. S. Vogt, Mechanical Engineer, P. R. R.

It is nearly ten years since I took up here at Altoona the subject of properly counterbalancing locomotives, the first case being that of some "C-anthra" engines for the New York Division, which had been equipped with 68 in. driving wheels.

After reading up on the subject and searching through what literature was available here at Altoona, I concluded that the rules laid down by Mr. D. K. Clark provided for an excessive amount of counterbalance, as his rules provided for the complete balancing of the total reciprocating parts, in addition to the balancing of the revolving parts.

It is plainly evident that it is impossible in a locomotive to meet the total requirements of the case, as the engine is an elastic piece of machinery, with movements in all directions, and if after the revolving parts are thoroughly balanced we add another amount of balancing for the reciprocating parts, the engine will be out of balance in a vertical direction. If, on the other hand, we entirely balance the revolving parts and add nothing for the reciprocating parts, the engine will be out of balance in a horizontal direction.

Among other writers on this subject a Frenchman, Mr. Couche, mentions the case of some Crampton engines used on the Northern of France and on the Eastern of France, during the year 1853, which on several occasions left the rails by the driving wheels jumping. This occurred only at high speeds, and it was shown after careful investigation that the cause was due to excessive counterbalancing, and that this had been obtained by fully counterbalancing the reciprocating parts. After the total amount of counterbalancing had been reduced, no more difficulty was experienced, even at the highest speeds. So that as long ago as the date mentioned practical evidence was in existence showing that it was not safe to fully counterbalance both revolving and reciprocating parts.

In all subsequent investigation on this subject I have only allowed a counterbalance for two-thirds of the weight of the reciprocating parts. In many cases this has answered perfectly well, and of those designs of locomotives of which I have had charge, like the "A-anthra" and "K" engines, I think the counterbalancing has been entirely satisfactory.

Some eight or nine years ago Mr. Cloud and myself made some experiments upon counterbalancing, varying not only the amount but also its location upon the drivers; taking an engine in the erecting shop and hanging it on the cranes suspended above the rails. In this position it was run at varying speeds, and diagrams were taken in both horizontal and vertical planes. The conclusion then arrived at was that it was better to place the counterbalance weights directly opposite the crank pins than to offset them at a certain angle relative to the crank pin, which the theoretical investigations showed would be necessary. I was, however, never satisfied that the conditions under which the engine was tried represented correctly the actual conditions when running on track, because, although the engine was suspended at the four corners, these points were suspended by

overhead beams, which were hung in the middle from the trolley, and really the engine only hung from two points instead of from four; and I am inclined to believe that a different suspension would have led to somewhat different conclusions.

There is no doubt in my mind that part of the reciprocating parts may be balanced by compression, and this, I believe, is largely done in the Porter-Allen engines and other engines of similar high speed type; but as these engines are run at constant speeds it is more easy to obtain the proper resistance. It would, therefore, appear that in a locomotive the course to be pursued would be to obtain the reciprocating balance partly from compression and partly from a special balance placed in the driving wheels, and to base the amounts of compression and balance upon the highest speed at which the engine is intended to run. As we increase the speed the disturbance due to unbalanced reciprocating parts would be more severe than at lower speeds. After all, any adjustment of balance must be a compromise and no absolute figures can be obtained.

Mr. S. P. Bush, Assistant Engineer Pennsylvania Lines West of Pittsburgh, South West System, writes: I do not believe it correct to balance by counter-weight on wheel the reciprocating parts, or those whose motion is rectilinear. In the best stationary engines these parts are not balanced by counter-weight, and, as you know, some of them run at high speeds and very smoothly. As Mr. Grafstrom says, it is impossible to balance a locomotive perfectly, for it is impossible to balance any machine in which motion is transformed from rectilinear to rotary. If, too, as Mr. Grafstrom says, a locomotive should always run at a constant speed, then it could be balanced somewhat better than if the speed were variable, and the same is true of the load. Effects of moving bodies vary as the square of their velocities, and thus the evil effects of poor balancing at high speeds. As a matter of experience I can say that but few of our engines are well balanced, and every one of them runs very much smoother when "shut off" than when using steam. The latter to me is evidence that our counter-weights are too heavy and not properly located.

It is thought that counterbalancing should be designed to suit the conditions of using steam. You will recollect that I attributed broken driving axles to the effect of counter-weights.

Mr. Edw. Grafstrom, Chief Draftsman of the same system, says: We do not think it necessary to add to the driving wheel a weight the centrifugal force of which will assist to overcome the inertia of the reciprocating parts. Cylinder compression and friction must be counted on to do part of the work. This gives me occasion to say that absolute counterbalance of a locomotive is an impossibility. The nearest approach one can make is to arrange the weight for certain conditions of speed and load, or, in other words, to calculate the counterbalance for the cut-off in which the engine is most generally worked. Under these conditions the work of compression and friction, plus the work done by this additional counter-weight, should be and can be sufficient to bring the reciprocating parts to a state of rest. The size of the counter-weight falls between zero and the maximum effect on the wheel of the reciprocating parts, and this maximum occurs at the moment the exhaust port closes. It follows that the counter-weight will not come diametrically opposite the crank pin, but in advance, and it will be less than is generally supposed necessary.

Fire Extinguishers on Locomotives of the Pennsylvania Railroad.

Several switching locomotives of the Pennsylvania Railroad Co., used around stations and wharves are equipped with the fire extinguishing apparatus illustrated in the accompanying sketches. The water forcing device, shown in figs. 1, 2, 3, is an injector A made by the Nathan Manufacturing Co., taking suction at either end, according as the cock 1 or 2 is opened, and discharging at two nozzles B, B. D is the valve in the steam pipe, admitting steam to the injector. Supposing all the water cocks to be closed, they are operated as follows to take suction from different points:

1. If a hydrant is used, the cap C is removed from the coupling, and a suction hose attached, connecting the orifice C with the hydrant. The delivery hose is then connected to either one of the openings B, B, after which cock 1 is opened; then valve D at the dome is opened, admitting steam to the instrument which starts it working.

2. In drawing from the saddle tank on top of the boiler, cocks 2 and 3 are opened, while numbers 1, 5 and 8 are kept closed.

3. If the supply is taken from the tender, cocks 1, 2 and 3 are closed and cocks 5 and 8 are opened; this allows communication direct through the suction pipe from the tender to the extinguisher. Of course, in this case, as in the first, steam valve D is opened last.

4. If water is to be drawn from a well, river or cistern below the level of the rails, a suction pipe is continued from coupling 6 to the point from which water is drawn, then cocks 2, 5 and 8 are opened, and cocks 1 and 3 are closed, as plug cock 5 controls the flow of water from the tender attached to the locomotive or from pipe 6.

Cocks with packed stems and having spiral springs above the plugs are used.

When a tender is attached to the locomotive, the hose reel, shown in figs. 4, 5 and 6, is located on the sloping back of the tank, and forms a support for the back head lamp. The barrel of this hose reel is composed of wood screwed to the arms and is provided with a crank on the outside of the casing in addition to the arms which are on the inside. When the locomotive has only a saddle tank on top of the

boiler, the hose is kept folded up on the front bumper of the locomotive, or in a small box located under the foot board in the cab. A nozzle with $\frac{3}{4}$ in. opening is used on the hose in connection with this extinguisher.

The vertical pipe 7 is simply a supply pipe for the locomotive injector.

Railroad Matters in India.

CALCUTTA, June 7, 1889.

The chief object of interest in both railroad and engineering circles during the last quarter has been the Lansdowne Bridge, over the Indus at Sukkur, which was officially opened on the 27th March by Lord Reay, Governor of Bombay. After considerable discussion and much delay, the site selected for this important work was fixed at what is known as the "Haji Moti" crossing and work was commenced in 1884. The girders are partly of steel and partly of iron, and were constructed by Messrs. Westwood, Baillie & Co., of London. The cantilever bridge over the Rohri channel consists of two cantilevers, each 310 ft. long, connected by an ordinary girder, 200 ft. long, thus giving a clear span of 790 ft. The bridge stood the tests of heavy, loaded engines, etc., very satisfactorily, but when the people crowded on to it during the opening ceremony the oscillation was so great as to seriously alarm many of them, and it was decided not to open the bridge for foot traffic at present, although all trains are allowed to cross. Mr. Robertson, who built the bridge, has tested the oscillation with the seismograph, and reports that in no case did it exceed two inches. He further states that the cantilever can deflect $2\frac{1}{2}$ inches to either side of the centre line, equal to a total motion of five inches, with only the ordinary working strain on the metal, and that even this amount might be rather more than doubled without passing the elastic limit. Be this as it may, the general opinion is that additional bracing is required, and after consulting with Mr. O'Callaghan, the new consulting engineer to the Government of India, Mr. Robertson has been sent home to consult Sir A. M. Readell, who designed the bridge, as to the best way of applying it.

The opening of the Mahanuddy Bridge, on the Assam-Bihar Railway, will shorten the journey from upper Bengal and Hindostan to Darjeeling by nearly 24 hours. Instead of first traveling to Calcutta, and waiting there for 8 or 10 hours, passengers and goods will cross the Ganges at Sahibgunge by ferry steamers, and be enjoying the bracing climate of the Himalayas by the time they would have been leaving Calcutta by the old route. Several important railroads are being pushed on vigorously. The Delhi-Kalka line, which should be opened by the end of next year, will not only reduce the distance from Calcutta and Bombay to India's summer capital, Simla, but will also divert a good deal of the wheat traffic which now goes to Bombay and Kurrachee to Calcutta; and if the Calcutta Chamber of Commerce obtain their wish, and a direct line from Mogul Serai to Calcutta is made, the City of Palaces may hope to regain a large portion of the wheat trade. The Kidderpore docks are fast approaching completion, and when they are ready for traffic railroad trains will be able to run direct from Delhi, and the large marts of Oude and the northwest provinces across the Jubilee Bridge, and unload into sea-going steamers of any size.

The Ragputana-Malwa Railway was for economy's sake constructed on the metre gauge; the folly of this connecting two of our 5 ft. 6 in. gauge lines, the East Indian Railway, at Delhi, and the Bombay, Baroda & Central India, at Ahmedabad, was seen years ago; but this season it has been more painfully evident than at any previous time, owing to the enormous wheat traffic. Engine drivers are being so overworked that one of them fell asleep on his engine a few days ago, ran past the station where he should have waited to allow another train to pass, and collided with a passenger train. Fortunately no lives were lost, but when men only have six hours' rest between trips, in a climate like India, the only wonder is that we do not have accidents every day. To save time two trains are often joined together, and two engines attached in front, thus throwing extra strain on the couplings. The number of wagon axles which have been broken on this line during the last year has been something enormous, and as they are all said to have been carefully selected from the best makers in England, the only conclusion I can arrive at is, that the native staff overload the wagons in order to get the goods away.

The Bengal Nagpur Railway will, when completed, open out a large tract of wheat country, and most of the grain should be shipped at Calcutta. This line will also lessen the distance between Calcutta and Bombay considerably, and benefit the coal industry. During the last 8 or 9 months, the coal traffic on the East Indian has been quite unprecedented, and all the coal companies are paying large dividends.

Cholera has been very bad in the Burmah District; over a thousand deaths were reported in one month, and in consequence of this, work on the Assam-Bihar line was nearly stopped, the coolies having stamped.

The government, taking advantage of its contracts with the different guaranteed railroad companies, is taking them over when the due date arrives. The East Indian was the first taken over, in 1880, and was promptly made over to the old company for twenty years. It has since paid better than ever, although the competition is now very keen. The Eastern Bengal was next taken over, and has been worked by government officials, assisted by a few of the old company's men. There have, however, been more accidents and complaints during the last five years than there ever were before.

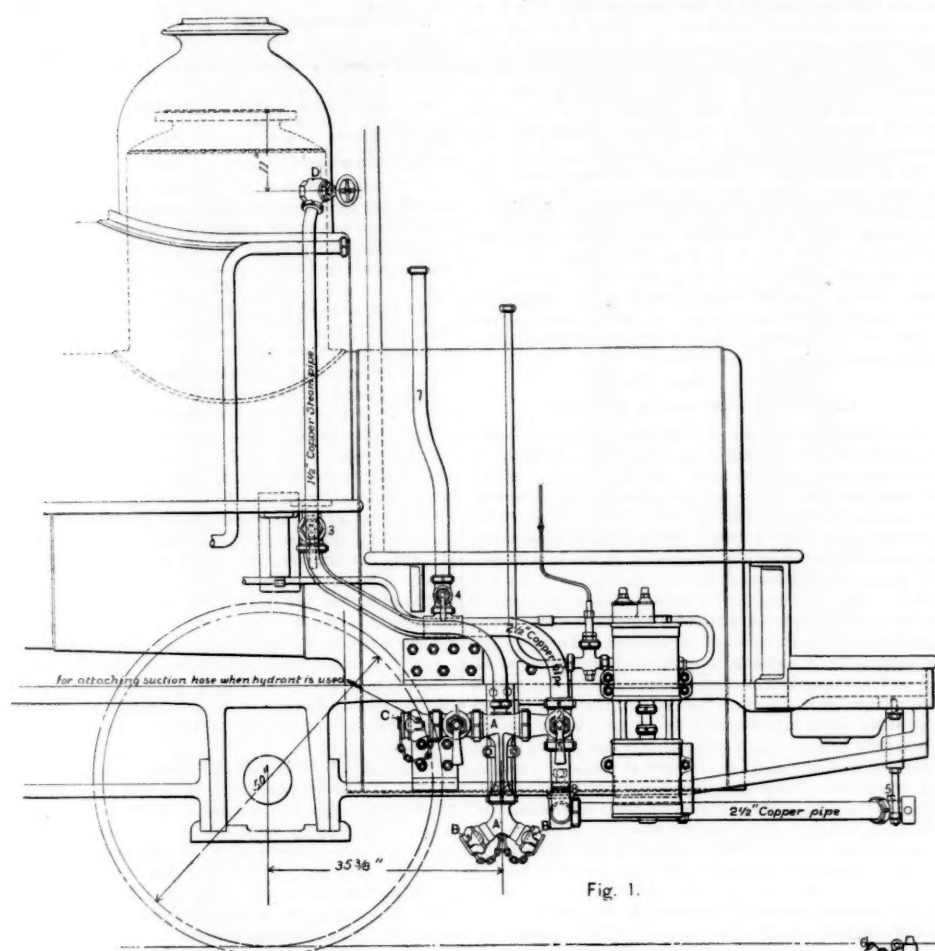


Fig. 1.

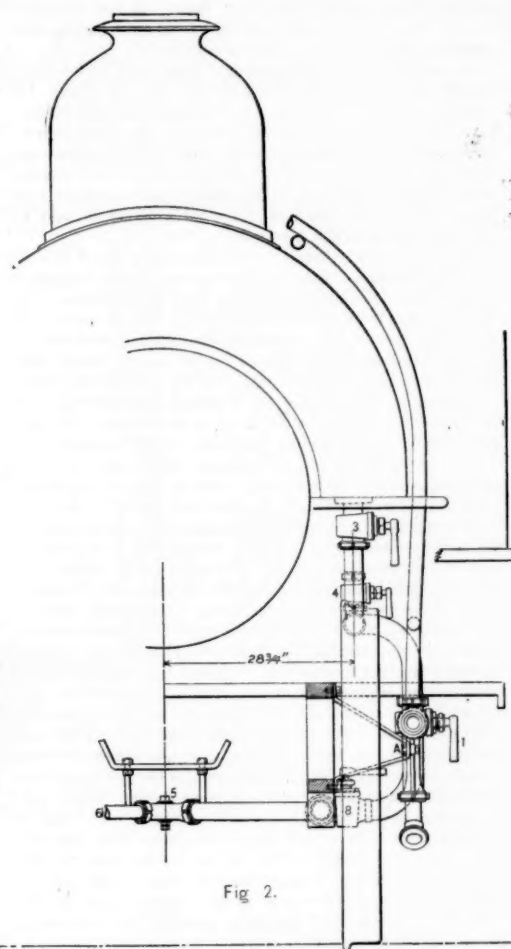


Fig. 2.

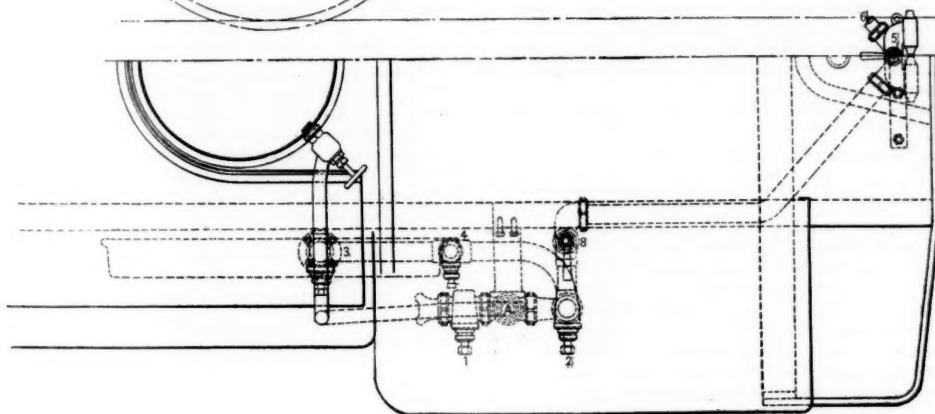


Fig. 3.

General Arrangement.

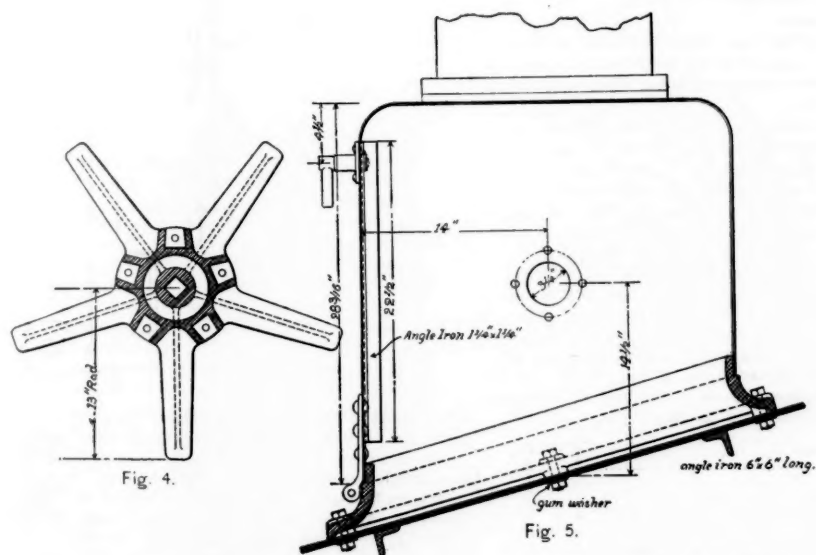


Fig. 4.

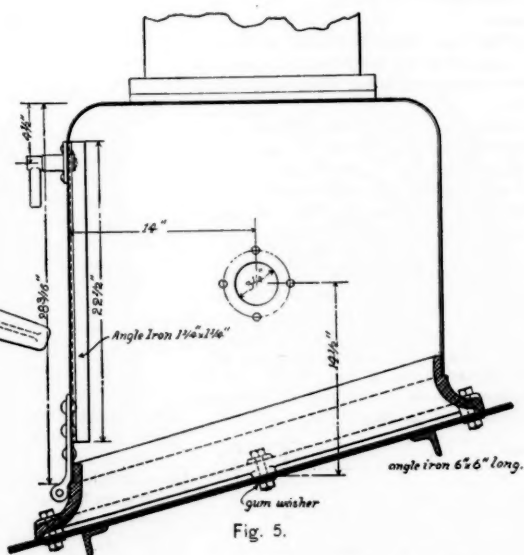


Fig. 5.

Hose Reel.

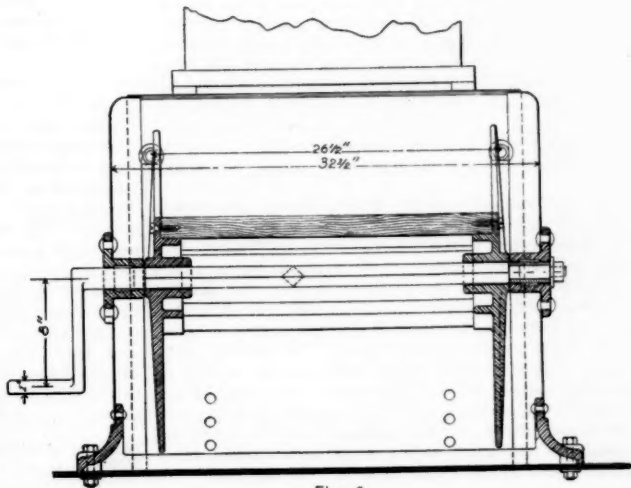


Fig. 6.

LOCOMOTIVE FIRE EXTINGUISHER.—PENNSYLVANIA RAILROAD.

fore. The Seinde, Punjab and Delhi and the Oude & Rohilkund have also passed into the hands of government, and the South Indian will follow suit next year, so that the Director-General's hands will be full unless some of the lines are made over again to private companies, a thing not at all unlikely,

for even its most strenuous advocates cannot say that state working of railroads has been a success so far.

Three survey parties, working in different interests, have been working between Mogul-Serai and Howrah or Hooghly during the last cold season. All but one, the "grand chord

party, have gone into recess quarters, and it is expected that all the plans, etc., will be ready in a few months' time.

The risks Indian engineers have to run may be judged from the fact that for two months past the thermometer has seldom been below 100 in the shade, and for the best part of

the time it has stood at 109 to 112 Fahr. A few days ago it was 116 at Allahabad, and to live in tents during such weather reminds one of the lower regions.

On the 15th of April a passenger train was blown completely over on the Northern Bengal State Railway; 19 wagons were thrown down the embankment and 10 carriages and one wagon went into the river, for, unfortunately, the train was on a bridge at the time. Seven people were killed, and 80 people, more or less, injured. From reports made it appears that one of the third class carriages was lifted bodily off the line, and the wind pressure is said to have been about 67 lbs. per sq. ft.

The "battle of the brakes" is commanding a good deal of attention just now. Some of your readers will be surprised to hear that, up to the present time, with the exception of a few suburban trains, we have been doing without continuous brakes on our mail and passenger trains. Owing, however, to the long gradients of 1 in 30 and 1 in 40, on the Bolan Pass line, the Government invited proposals from the different brake companies, and two brakes, the Westinghouse automatic and the automatic vacuum, were tried in the presence of delegates from the principal railroads, some months ago. As the reports of the different officials were private, it is almost impossible to tell how they voted; in fact, it is said that some delegates, or officials, who had been present at the railroad conference, held at Simla, but who were not present at the brake trials which followed it, were asked, or allowed, to record their opinions as to which was the better brake. At any rate, the Government, acting on the advice of Sir Guildford Molesworth (then consulting engineer), decided upon adopting the automatic vacuum, and has sent home a large order for material, which is to be followed by others, as soon as funds are available. This has caused a good deal of ill feeling, for the public think that if they have to pay for a patent continuous brake they are entitled to the best procurable, and the recent failures at Moorgate street and Holyhead are not likely to give any one confidence in the automatic vacuum. Besides this, an idea has got about that this brake was chosen because it was an English patent, and people here have a horror of anything of this sort. One of the objections made against the Westinghouse was that the trial train was parted twice, owing to its stopping the vehicles so suddenly. It has, however, been proved that on one occasion this was due to a faulty coupling, and on the other, the driver worked the lever contrary to the orders given by the representative of the Westinghouse Company. Two engineers who were present at the trials thought that they saw a defect in the Westinghouse system, and have invented a retaining valve which, they assert, will remedy it. In describing Messrs. Bell and Robertson's patent a writer says: "The principal inconvenience in the Westinghouse brake is on long and steep grades, such as are found on few lines; because it cannot be applied with moderate force, so as just to check the descent, but goes on with a slam and pulls up the train, then has to be released, and so soon as the speed has got up, applied again. The invention in question gets rid of this difficulty by operating the retaining valves from the foot plate, and by using the air instead of a dead weight enables their force to be regulated to any desired amount."

The owners of the Westinghouse patents will no doubt feel awfully obliged to the above-mentioned gentlemen for perfecting their brake.

Improved rolling stock is being called for, and some of your builders may soon find an opening for some palace cars.

CALCUTTA, June 7, 1889.

RAILROADER.

Overhead Cranes in the Westinghouse Electric & Manufacturing Co.'s Shops.

In this issue we illustrate the arrangement of the machine shops of the Westinghouse Electric & Manufacturing Co., showing the overhead cranes. These shops occupy, with many additions and alterations, the building formerly used by the Union Switch & Signal Co., on Duquesne Way and Garrison Alley, Pittsburgh. The heavy dynamo work is done in the machine shop, an iron-clad building, shown by the illustration, which is that part of the structure formerly used by the Union Switch & Signal Co. for erecting signal posts, frogs, etc.

The shop was laid out by Albert Schmid, Superintendent of Shops, with the view of reducing to a minimum the labor incident to the erection of the machinery. It is composed of five divisions, each traversed by a 10-ton traveling crane. It was impossible to carry the shafting from the roof, and, therefore, it was determined to employ pillars to furnish a support for the shafting hangers. These pillars also support the cranes. The result is a well-arranged shop, in which all the work can be handled by traveling cranes. The traveler guides and supports are formed of timber, the guides being spliced and the posts well braced together. The girders of the travelers are formed of two stout channel irons, with wooden filling pieces bolted to the hollow sides of the channels. The traveling trolley carries a pair of Harrington's hoisting blocks; these blocks and the whole traveler can be made to traverse the entire length of the shop by means of suitable gearing worked from the ground by endless hand chains.

The arrangement of the shafting is shown in the illustration. The main shafting is carried between the posts supporting the traveler guides. The counter-shaft brackets are attached to the traveler guides.

A line of rails runs down the centre of each aisle between the machine tools, and on trucks running upon these rails all parts of machinery can be loaded and taken to another shop or to the yard and delivered to drays to be conveyed to freight yards for shipment. The rough castings are de-

livered from the foundry to the Duquesne Way side of the shop, where they are picked up by a crane and conveyed to the division marked "Planers and Boring Mills;" thence they travel through the division marked "Lathes" to the testing room, which runs longitudinally through the shop. At this point the dynamos are supposed to be completed, and are then subjected to a thorough test, after which they are sent to the shipping room.

One 100 horse-power Westinghouse standard engine runs the main machine shop. Two 250 horse-power Westinghouse engines, coupled to a 4-in. main shaft, drive the dynamos in the testing room. On the main shaft are friction pulleys, by means of which any individual dynamo can be coupled on at any time without interfering with others that are running. All the main and counter-shafts are so arranged as not to interfere with the cranes. At present the overhead cranes are driven by hand power, but they will soon be fitted with alternating current Tesla motors.

Locomotive Engineering at Paris.

To an American engineer nothing will appear so remarkable at the Paris Exhibition as the display of locomotives by continental and English builders. No American locomotives are there, which is to be regretted, for alongside the English engines they would have served to show that though not agreeing in framing and details, the two great branches of the Anglo-Saxon family are practically at one in their general engineering ideas and forms of construction. As it is, however, England alone, with three standard locomotives and one built for a South American line, is the sole representative at Paris of that simplicity of form and detail which we hold to be so essential a feature of successful work. Without personal observation it is impossible for our readers to obtain an idea of the vagaries and complexity of the continental European engines, all, with one or two exceptions, only appearing to vie one with another in the multiplication of parts of the valve gear, etc., which is perfectly astounding. What adds to the curious appearance of many of these engines is the placing of eccentrics on pins or sheaves, carried by an arm projecting from the wrist pin of outside-connected engines. Such a design appears very strange to us, though the apparent increase of stress on the wrist pin may be by no means real; indeed the bending stress on the pin may be somewhat reduced by this detail. One engine alone aims at Anglo-Saxon directness and simplicity, and this one is a four-coupled passenger express engine, with leading four-wheeled truck of the Chemin de Fer de l'Ouest of France, an engine very closely modelled on English design and of the following main dimensions:

Cylinders.....	460 mm. x 660 mm
Coupled wheels.....	2,640 m
Weight.....	Kilos.
Leading truck wheels.....	9,000
Trailing ".....	9,500
First drivers.....	14,800
Second drivers.....	14,500
Total.....	29,300

Tractive power 6.8 kilograms per square centimeter, or about 95 lbs. Among the many engines there this is decidedly the best of continental design.

Very conspicuous are the locomotives of the Société Cockerill of Seraing, Belgium, for they have rectangular smokestacks. Other engines have piston-valves and release cut-off gears and numbers have valve-gears which are complicated modifications of the well-known Walschaert gear. We must confess that, with so enormous a complexity of rods, joints, etc., exposed to the dust which is such a feature on continental roadbeds, we cannot see in what respects so complicated an arrangement can justify its existence in the face of the simpler gears. It is a positive relief to turn from a contemplation of so much unnecessary complexity to the severely simple English engines.

Foremost among these, and specially notable in illustrating the further development of the single engine, is the newest type of locomotive constructed at the Derby shops of the Midland Railway Co.

Until quite recently the Midland has adhered to the four-coupled engine for passenger traffic of the highest class, such as the Manchester and Scotch traffic, and it is quite a departure to find it adopting the single engine like its rival the Great Northern Co., which has long run outside-connected 8-ft. single engines with great economy and success. The reason for this is, of course, that at high speeds the adhesion of a single pair of wheels is amply sufficient to utilize all the power of the cylinders, and that for ease in running and economy of fuel it is considered better to sacrifice a little rapidity in starting up in preference to buzzing round a heavy coupling rod at high speeds without useful effect. Following in the same train of thought, Mr. Johnson has brought out single engines on his line, and the following are the principal dimensions of the one exhibited at Paris.

Diameter of cylinders.....	1	6 1/2
Stroke.....	2	2
Steam lap of valves.....	1	1
Lead, full gear.....	3/4	full.
Cylinders, inside frames, centre to centre.....	2	4
Truck ".....	3	6
Trailing ".....	4	0
Truck centre to driving centre.....	10	1/2
Driving centre to trailing centre.....	8	9
Truck wheel centres.....	6	0
Wheel base, engine.....	21	9 1/2
" " and tender.....	43	2 1/2
Boiler pressure.....	10	160 pounds.
Length of boiler barrel.....	10	4
Mean diameter, outside.....	4	2
Fire-box length, outside.....	6	6
Tubes, number.....	244	244
" diameter.....	2 1/2	1 1/2 in.
Heating surface, tubes.....	1123.5	sq. ft.
" firebox.....	117	
Total.....	1240.5	sq. ft.

Grate area.....	19.6	sq. ft.
Weight in working order.....	96,320	pounds.
On driving wheels.....	39,200	"
Tender, capacity.....	325,000	pounds water.
" " weight in working order.....	7,840	" coal.
Mean gross load, London to Nottingham, 380,800 to 481,600 pounds, or 9 to 13 carriages.....	53 1/2	miles.
Scheduled space.....	20 to 23	pounds.
Longest run without stop.....	124	miles.

It is thus seen that the adhesion is that due to nearly 40,000 lbs. on one pair of wheels only, but this is ample at high speeds, and single engines do not slip their wheels at high speeds. To provide starting adhesion there is fixed before each large wheel a steam sanding device, by which a fine jet of sand is blown under the tread of the wheel.

The engine is inside connected, and it is to be noticed that the Great Northern Co., whose fine 8 ft. express engine has outside cylinders, has also within the last few years brought out a single engine with inside connections.

From a small card presented us on the engine by the Midland Co.'s representative, we note that the Midland line is full of grades, the worst being of about 59 ft. per mile for 10 miles, though there are short bits of considerably greater inclination, as 140 ft. per mile. From London to Nottingham, 124 miles, is perhaps the fastest long scheduled run in England, not so fast as was scheduled perhaps in the Scotch race of last year, but a regular day by day run the year through. The tractive force of this engine is 96 lbs. per pound of mean effective pressure, and in view of the probability of higher speeds between the chief American cities for certain trains, it seems proper to suggest to American engineers that they should take notice of this locomotive.

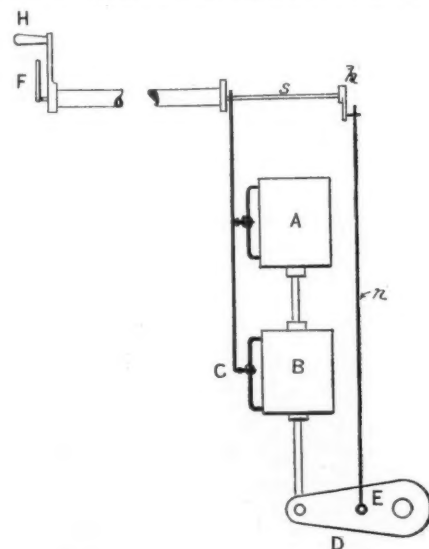
As in America the freight engine is found of numerous types, so in England the types of passenger engines are numerous, and an example of the English type of four-coupled engine is shown by the South Eastern Railway Co. from its Ashford works.

This is an eight-wheeled engine with a leading four-wheel truck, and inside connected cylinders 19 in. x 26 in. The driving wheels are 7 ft. coupled; the area of grate is 16.78 sq. ft., and the heating surface of the fire-box is 103 1/2 sq. ft. There are 202 tubes 10 ft. 8 in. long, and 1 1/2 in. outside diameter, and with 917 sq. ft. of heating surface, making a total heating surface of 1020.5 sq. ft. The boiler barrel is 4 ft. 4 in. diameter, and the weight, in working order, 92,960 lbs., distributed as follows:

On the truck.....	30,016	Pounds.
" " driver.....	34,160	"
" " trailer.....	28,784	"

The tender capacity is 28,500 lbs. of water and of coke, the fuel burned is 7,840 lbs. These engines run the Folkestone express, and have a very handsome appearance.

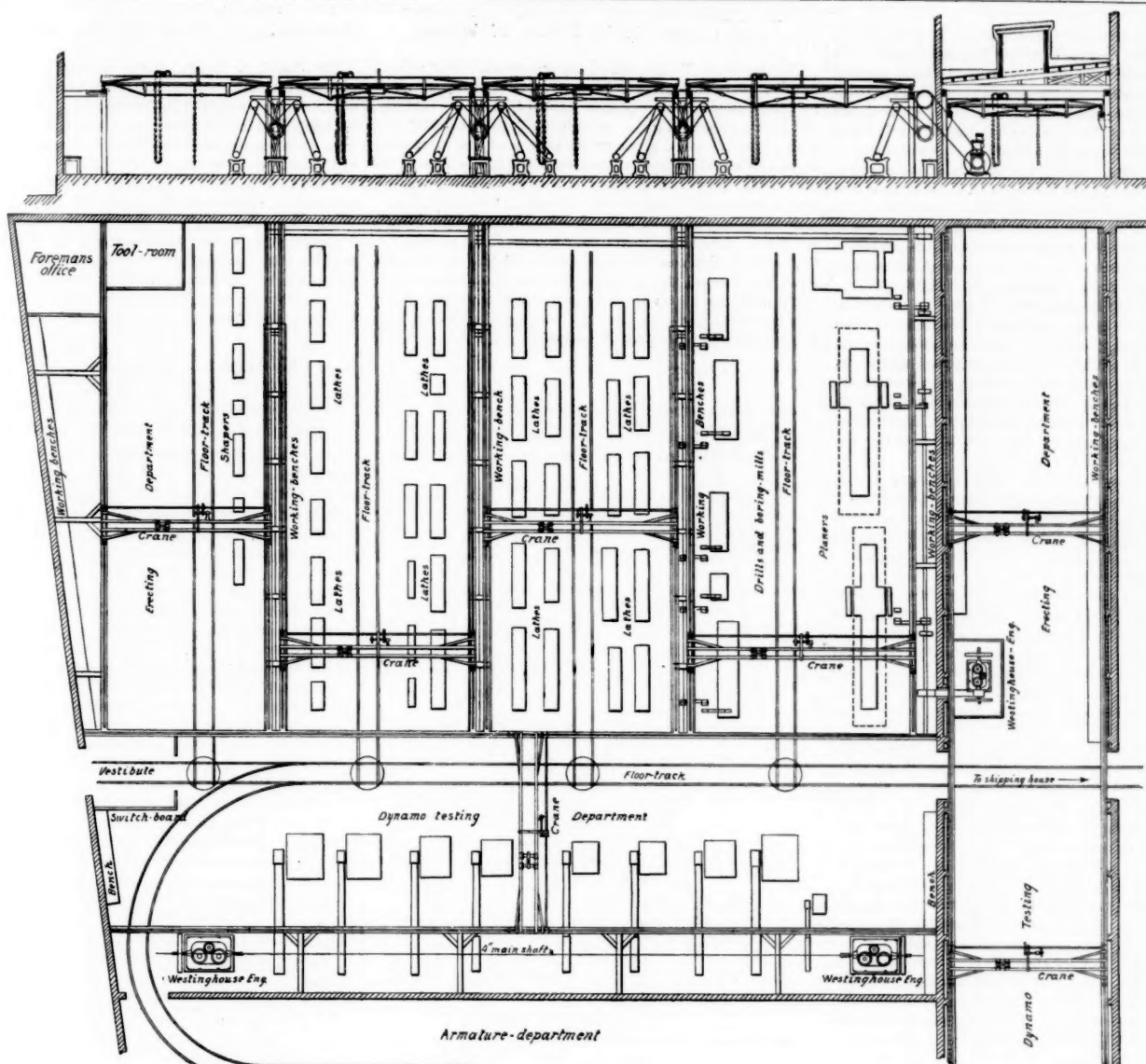
They are fitted with a steam reversing gear of very simple and effective design, consisting of a small steam cylinder A fixed just in front of the main driver on the right side of the boiler. The piston of this cylinder is carried upon a piston rod which continues through an oil cylinder B and carries a piston in this oil cylinder. Steam can be admitted to the upper cylinder at either side of the piston by a single motion of a short lever in the cab, in easy reach of the engineer. The movement of this lever not only admits steam to the upper cylinder, but opens and closes a valve or cock C on the only



communication between the two sides of the oil piston. The piston rod projecting below the oil cylinder takes hold of the reversing lever D on the weight shaft. A small pin E on this reversing lever actuates through suitable rod n, lever h and shaft s, an indicator F immediately in front of the engineer's handle H. To move the gear the engineer moves the lever to the right or left and admits steam to the desired side of the piston and opens the oil passage C. The gear moves and the position of the link is indicated by the pointer F, when the engineer puts the handle to the middle position, which shuts off steam and closes C. The oil, being incompressible, then holds the gear rigidly in position until again set moving by the engineer.

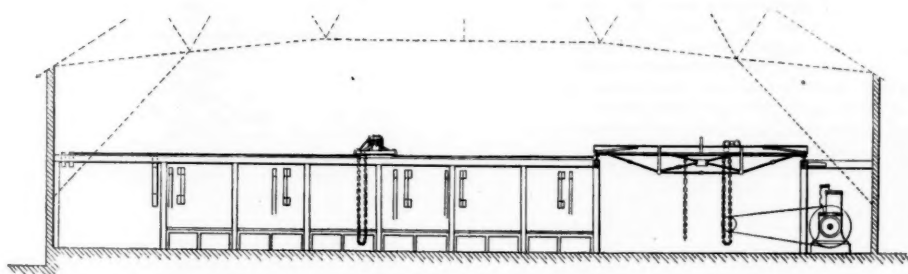
This reversing gear is both simple and effective, and saves an immense amount of fatigue on the part of the engineer.

Less characteristic of the general English type, and yet a by no means uncommon general design, is the passenger



Plan and Longitudinal Section.

OVERHEAD CRANE SYSTEM.—MACHINE SHOP, WESTINGHOUSE ELECTRIC & MFG. CO.



Transverse Section.

engine of the London, Brighton & South Coast Railway, from its shops at Brighton. This engine is coupled forward for the purpose of making use of the superior weight of the forward portion of the engine. Though generally held that forward coupling is unsuitable owing to the larger leading wheel, it is not found in any way unsafe on the Brighton line, or indeed on other lines in England, where many forward coupled locomotives are used, as on the Lancashire & Yorkshire and Great Northern lines.

The engine exhibited has cylinders $18\frac{1}{4} \times 24$ in., with $6\frac{1}{2}$ ft. coupled wheels on a 7 ft. 7 in. wheel base. The trailing wheels are 4 ft. 6 in., and the tractive force is 110 lbs.

A remarkable feature of the engine is the smallness of the tubes, $1\frac{1}{2}$ in. outside diameter and 333 in. number, giving a heating surface of 1,378.2 sq. ft. The fire grate has an area of 20.65 and a heating surface of 113.9 ft. The total engine weight of 86,698 pounds is distributed, 23,296 on the trailing wheels, 30,912 on the leading wheel, and 32,480 on the main driver. The tender weighs 61,264 lbs.

It is evident that for its work, hauling heavy passenger trains at high speed over a fairly direct road, this engine is fairly well proportioned.

A peculiarity in the mechanical construction of the engines adopted by Mr. Stradley, the Locomotive Superintendent, is placing the coupling-rod pins on the same side of the axle as the inside crank. It is clear that by this method of constructing the pressure of the piston is transmitted to the coupling rods very much more directly than when the inside and outside pins are at opposite sides of the axle. The pressure on the axle-box guides is much reduced, and if at all slack this may, and Mr. Stradley says does, conduce to

easier working. The disadvantages of the method are, first, the necessity for a much heavier counter-balance in the wheels and a greatly increased bending moment in the cranked axle, which should therefore be made somewhat stronger. The details of Mr. Stradley's engine are well worked out, and though a forward-coupled engine lacks the good appearance of the commoner type, it would appear to have good reasons for existence, and as these engines give every satisfaction we may suppose that forward coupling has not the faults attributed to it. Indeed, examples might be quoted where forward-coupled engines have proved good and safe for years on lines of very sharp curvature as, for example, on the railroads of New South Wales, where the first four locomotives sent out to the colony by Stephenson, of Newcastle-on-Tyne, in 1854 were some of them running in good order in 1880 or later. They were forward coupled and ran over curves of 528 ft. radius.

An interesting locomotive at Paris is the Crampton engine of the Chemin de Fer du Nord, exhibited in the Annexe of the Anciens Etablissements Cail. The Crampton patent locomotive has large rear, single, driving-wheels, the axle passing to the rear of the fire-box. Crampton claimed great steadiness of running, and we believe his principles produced a safe and good engine. That on view at Paris is now 40 years of age, and still in working order.

Another curious engine, less likely to come into use, is the large coupled engine of which accounts from time to time appear, with 8 ft. wheels, and designed by M. Etol. The tender also has 8 ft. wheels and a carriage, also with 8 ft. wheels, is shown on the same principle of construction in which some of the passengers are carried in a box slung be-

tween the wheels and others on a platform above them. This rolling stock is interesting only in its curiosity.

Of by far greater interest to engineers is the "Locomotive No. 1" of the Stockton & Darlington Railway from the pedestal in front of the Northeastern Railway at Darlington. The Rocket is here, too, as it originally appeared at the Rainhill trial, and near by is an old engine by the famous Trevithick. This engine, we believe, was once run as a locomotive. Its date is 1803. It has a cast-iron boiler and a single cylinder vertically on the end of the boiler crown, with return connecting rod and a square-holed crank fixed to a square-ended shaft by numerous wedges, and a fly-wheel some 6 ft. in diameter.

Speaking generally, the locomotives at Paris made by European builders do not begin to compete in design with those of America or England. This is the more remarkable in view of the fact that for stationary engines some of the continental makers, as Sulzer, of Winterthur, are in the very first rank of excellence, both in design, workmanship and finish. We do not doubt that they will ere long follow the Anglo-Saxon type of locomotive also, dispensing with the unnecessary multiplicity of parts and curious devices visible in the Paris Exhibition.

Wire Cable Welding by Electricity.

BY O. K. STUART AND A. M. BULLARD.

The Trenton Iron Co., of Trenton, N. J., have ordered machines of the Thomson Electric Welding Co., of Boston, Mass., for welding a special wire cable of their manufacture. These machines will be of the most improved type built by the latter company, and will be capable of welding these cables up to $1\frac{1}{4}$ in. in diameter.

The cable is of peculiar construction and is distinguished by high tensile strength, great flexibility and admirable wearing qualities, all of which are due to the remarkable construction and the quality of the material used in it. The cables are made of hard drawn, low carbon steel, of great uniformity, and are of various diameters, but all constructed substantially in the same manner. The diameter of the pieces upon which tests were made was .908 in.

The construction of the cable is well worth description. It consists of four successive layers of wires, with a single round wire for a core. Looked at end view, it shows four concentric rings of different thicknesses, with a fine single

wire core. The first or outside layer or ring is made up of 24 wires, cold drawn, and each wire fitting neatly and locking with the next adjacent. The next layer or ring consists of 19 wires, which, when laid up against each other, make a complete circle, whose outside circumference is equal to the inside circumference of the first layer. The third layer is made up of 12 round wires, the area of the cross-section of each of which is larger than that of any of the wires of which the last or fourth layer is composed, these being round also. The core is round wire, as stated above, and is as fine as any of the others. Each layer of wire has a direction of twist along the length of the cable opposite to the direction of twist of the next layer or layers, and the angle of twist of each layer is different from that of any other layer.

We have entered into these details minutely in order that the difficulties of solving the problem of welding the cable may be apparent. The solution involved unusual preparation of the ends to be joined, the employment of special devices, and more than ordinary care in the operation of the welding apparatus; and it was only after considerable experimenting under the direction of Prof. Elibu Thomson had been done that the satisfactory results mentioned in the latter part of this article could be secured.

The following absolute conditions had to be met: 1st. It was necessary to provide means for preventing the individual wires from fraying outward when the endwise pressure used in the welding was applied. 2d. It was necessary that the cable be gripped in such a manner as to prevent sliding movements of the wires with relation to each other. 3d. An unusual preparation of the ends had to be made in order to accomplish, at least approximately, the individual welding of the wires composing the cable, so that in bending around a sheave the load strains might be distributed at this point in the same manner as at any other point. 4th. It was necessary to have the ends of the wires at one terminal as nearly as possible in line with the ends of those in the other terminal.

In order to prevent the fraying and expanding actions above mentioned, it is found necessary to shrink mild steel or iron sleeves or collars tightly upon the cable close to the ends (about $\frac{1}{16}$ in. therefrom); and this arrangement is found effective in preventing the wires from sliding over each other when the pressure is applied in welding; but it also prevents the separate welding of the individual wires forming the cable, a difficulty overcome by special preparation of the ends of the cable, viz., by cutting grooves between the ends of the contiguous layers of wires, forming thereby a series of concentric circular grooves. This permits of a definite amount of "upset" of softened metal at the end of each wire, which must be allowed for, it being caused by the endwise pressure used in forcing the pieces together when the welding temperature is reached; and permitting also, therefore, the welding of the individual wires forming the cable. The ends of the separate wires can be brought exactly opposite each other by the exercise of ordinary care upon the part of the operator of the machine; and with these preparatory arrangements made, the joining of the cable is a problem in plain butt welding by electricity.

The great and peculiar strains to which cables are frequently subjected, make it necessary that they possess high elastic limit and tensile strength, combined with extreme flexibility, and any method of joining cables which destroys these qualities would be useless as applied to such work. In experimenting, therefore, it was a matter of the first importance to determine the tensile strength and breaking loads of all welds made, and this was done either on a Riehle 100,000 lbs. testing machine in the factory of the Thomson Electric Welding Co., at Lynn, or under the supervision of the United States Government on the Emery machine at the Watertown Arsenal.

The material of which the wires forming the cables are composed being of steel, it is obvious that heat will anneal it if allowed to cool slowly, and it was necessary consequently to determine the respective tensile strengths of the unannealed and annealed cable. Tests made at the Watertown Arsenal, with hydraulic clamps, show the cable to have a maximum tensile strength of about 67,700 lbs. per square inch, and this strength drops to about 50,700 lbs. when the metal is annealed by heating to a temperature slightly below that of welding, and allowing it to cool slowly. If, therefore, welds are made which will stand a maximum load of 50,000 lbs. or over, a practically perfect result will be obtained, provided elasticity and flexibility are not destroyed. The tensile tests of the welded cable give the most perfect results, the maximum tensile strength of the welded specimens averaging over 50,000 lbs. some specimens resisting as high strains as 53,000 and 54,000 lbs. per sq. in., which is over 80 per cent. of the maximum load stood by the unannealed cable.

Although it was found to be extremely difficult to obtain accurately the elastic limit, either in the unwelded or the welded specimens, yet the indications are that the ratio of elastic limit to maximum load in unwelded specimens is about that of the welded specimens.

Severe bending and twisting tests give similarly good results, the cable resisting bending back and forth many times, over an angle of 180 deg. at the weld. In such cases, the fractures are always irregular and away from the weld, and present a gray, fine granular appearance, all of which proves that the condition of the cable at the weld is approximately what it was originally.

The value of the electric process, as applied to such work, will be appreciated when it is considered that notwithstanding the difficulties encountered, and the fact that groups of wires and not solid metal were united, over 80 per cent. of the normal strength is obtained in the electric weld, rendering it practicable to use it for many purposes heretofore impossible.

Trains Tied Up by Failure of Wires.

The Master of Trains, whose communication was printed in the *Railroad Gazette* of June 21, writes us to the effect that the problem then presented was to him a very real one, and that a passenger train due to leave T. (see diagram) at 8 p. m., was delayed 5 hours by the failure of the wires after an order had been placed at that place for it, the train at the time being some distance away on a connecting division. A freight train was to follow a short distance toward J., and it was decided to run it as a second section of the passenger train, say No. 1. The order was "No. 1 will carry signals T to W," and after it was repeated and O K'd, the wires failed. No. 1 was delayed about 5 hours, and all second-class and inferior first-class trains on the entire road correspondingly. Our correspondent says that the conductor could not have flagged himself out unless he had flagged 85 miles. There



Sketch not drawn to scale. The figures show approximate distances in miles.

were only four telegraph offices open between the dispatcher's office D and T. They had the usual regulations for testing the wire, when open, by using the ground, but it does not appear how faithfully or effectively they did this. An order might possibly have been sent over Western Union lines and those of other railroad companies via A, B, C, D, E, but it would have to be repeated at r^1 and r^2 and carried by messenger from B to C, and experience had taught that probably four hours would be consumed if that course were taken.

Different men would take different ways of meeting such a difficulty as this, and it would be useless to speculate as to the comparative value of the various possibilities. Doubtless, the general manager of the Western Union Telegraph Company, had he been on the ground, would have got a message through over the 700 or 800 miles in a short time; many railroad managers would do nearly as well as he; but the question is whether it is practicable to place this reserve power for emergencies so that it will be available for every dispatcher in the dilemmas that he may encounter. If the lives of a train-load of passengers had been at stake, the dispatcher would have felt justified in threatening to shoot any operator, home or foreign, who should waste time in parleying, but with a less pressing message his energies would be less vigorous and less effective. If the four night operators did not do all in their power to locate the trouble on the wire, the remedy lies in stricter discipline, which, as every dispatcher knows, and every superintendent should know, is not an instantaneous process. If, after the difficulty were located within say 10 miles, the dispatcher had not the means or the authority to cover that distance with a special engine, he was not properly equipped for emergencies. All these difficulties could of course easily be foreseen, and the practical question with the superintendent is, or should be, Are my provisions for such emergencies fairly adequate in view of the annoyance and expense of a long delay to a passenger train? If there are no definite arrangements with connecting lines for rushing messages in special cases; if night operators are young and inexperienced, and have never been told the nature of the emergencies likely to arise in their positions; if there are too few night offices to promptly handle trains except when everything works favorably; if dispatchers are allowed no discretion whatever; or if, from overwork or from too close attention to chess or other outside matters, they do not study their business sufficiently, and sometimes send orders "an unnecessarily long time before delivery" (rule 521); if telegraph poles and wires are not kept in first-class condition; why, then, the company must expect an occasional serious delay. But there is as yet nothing to show that such a delay is not preferable to any change in rule 510.

Interlocking and Block Signaling in Great Britain.

The Board of Trade return showing the percentage of switches concentrated and interlocked, and of miles worked under various modifications of the block system, for the year ending Dec. 31, 1888, has just come out. The number of cases upon the roads of the United Kingdom in which the signal and switch levers are interlocked is 34,904, being an increase of 779 over 1887. The cases where they are not interlocked number 3,861, which is 10 per cent. of the whole, while last year the number was 4,096, equal to 11 per cent. of the whole. Each company sends in a detailed list showing every piece of single or double track that is worked by the absolute or permissive block system, or by any other telegraphic system, or by the train staff. These lists occupy 57 pages, and a summary of them shows the following:

	Double track.	Single track.
Total miles of road open for passenger traffic.....	10,387	8,100
Distance worked by absolute block.....	9,941	5,085
Distance worked by permissive block.....	51	26
Distance worked by telegraph, but not on either of the foregoing systems.....	80	160
Distance of line worked by other systems.....	—	2,815

The 5,085 miles of single track worked by the block system also has the train staff system, except 280 miles, of which 148 miles is on the Great Western. The train tablet system is in use on 388 miles, which is also included in the above totals. The percentage of double track road worked on the absolute block system is 94. In 1887 it was 93. The percentage in England and Wales is 97 and in Scotland 99, but for Ireland it is only 81.

A number of the companies make special reports of the progress made during the year and of their plans for the coming year. The Lancashire & Yorkshire has put in 172 sets of electrical apparatus for repeating the action of signal arms, and 61 telephones for facilitating the working of traffic. The Belfast & Northern Counties road expected during 1889 to introduce on the line between Ballymena and Parkmore a telegraph system, in addition to the train staff.

The report gives no statistics of any automatic or other electric locking of block signals, but we have been favored by a correspondent with a statement showing the extent to which the Sykes electric locking is in use in the United Kingdom. This statement, which follows, is believed to be correct, though it is not official:

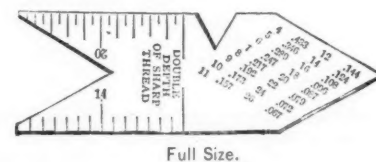
LIST OF RAILROADS ON WHICH THE SYKES ELECTRIC INTERLOCKING AND BLOCK SYSTEM IS IN USE.

England.	
London, Chatham & Dover, 186 miles.....	all signal boxes.
Metropolitan District, 21 miles.....	all " "
London, Brighton & South Coast.....	8 " "
Hull & Barnsley, 60 miles.....	all " "
Mersey Tunnel, 3 miles.....	all " "
Wirral.....	all " "
South Eastern.....	2 " "
Great Western.....	5 " "
Great Eastern.....	3 " "
London & South Western.....	4 " "
Scotland.	
Glasgow & South Western.....	3 " "
Ireland.	
Dublin, Wicklow & Wexford.....	3 " "

This system is in use on the Southwestern of Russia at Odessa, and there are 100 towers equipped with it in the United States.

Improved Centre Gauge.

Various uses of this handy little instrument are shown in the engravings. The angles used are 60 degrees. The four divisions upon the gauge of 14, 20, 24 and 32 parts to the inch are useful in measuring the number of threads to the inch of taps and screws. The following parts to the inch can be determined by them, viz.: 2, 3, 4, 5, 6, 7, 8, 10, 12, 14, 16, 20, 24, 28 and 32.

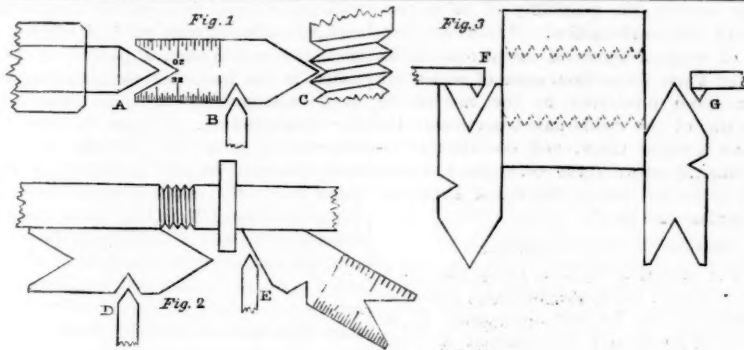


In Fig. 1, at A, is shown the manner of gauging the angle to which a lathe centre should be turned, at B, the angle to which a screw thread cutting tool should be ground, and at C, the correctness of the angle of a screw thread already cut.

In Fig. 2, the shaft with a screw thread is supposed to be held between the centres of a lathe. By applying the gauge as shown at D, or E, the thread tool can be set at right angles to the shaft and then fastened in place by the screw in tool post, thereby avoiding imperfect or leaning threads.

In Fig. 3, at F and G, the manner of setting the tool for cutting inside threads is illustrated.

The table on the gauge is used for determining the size of tap drills, and shows in thousandths of an inch the double depth of thread of taps and screws of the pitches most commonly used. This table is made up by dividing 1.732, the double depth of thread of a screw that is one pitch, by the number of threads of the various pitches shown. As the double depth of thread represents the difference in the diameters of a tap and a tap drill, to obtain the diameter of a tap drill of any desired pitch it is only necessary to subtract the decimal showing the double depth of thread of that pitch from the diameter of the tap. For example, if the tap is 4 pitch and 1 in. diameter, subtract .433, the decimal showing the double depth of thread of this pitch in the table, from one, and the result, .567 of an inch, is the size of the tap drill, which would allow a sharp thread in the hole. The customary allowance may be made for the extent to



Improved Centre Gauge.

which it is desired the threads should be flattened. This gauge is made by Messrs. Darling, Brown & Sharpe, Providence, R. I.

Association of American Railway Accounting Officers.

The annual meeting of this association was held at Niagara Falls, N. Y., on July 10 and 11. There was a large attendance, about 130 members being present from all parts of the United States and Canada. President Marshall M. Kirkman occupied the chair. In his opening address he said: "The increased attendance is a cause of congratulation. The association is still in its infancy. When accounting officers learn that it is not designed to bring any pressure to bear upon those who do not agree with the majority, that the sole purpose of the organization is to facilitate a better knowledge of accounting, they will all seek admission. The usual competition and strife of railroad life does not exist between accounting officers. They meet upon common ground. * * * If only 10 men had met here to day, instead of 150, the meeting would still have been a success because of its value to attendants and to the companies they represent. Our association must not be discouraged if a great deal of completed work is not accomplished. Let us not be in any hurry to pass resolutions. Let us be satisfied to discuss that which is best, trusting to the good sense, honesty and sagacity of accounting officers to adopt the same as fast as they are able. We shall learn what is best from discussion. The threshing machine, in separating the wheat from the straw, seemingly has no other purpose than to raise a cloud of dust to envelop and irritate us. The air is filled with chaff and flying particles. But amidst it all the golden drops of wheat fall one by one into the waiting receptacle. Our association is destined to dispel the provincialism in which the accounting officer of the past has enveloped himself. We can all learn something. I have never been in the presence of an accounting officer half an hour without learning something valuable from him about my business. Our association is formed for business purposes exclusively. We design to work six hours a day in convention and supplement that with six hours of consultation and advice. Let everything that is said be accepted as coming from a friend and not from an enemy."

"A word in regard to the future of the association: I think I have the love and affection of its members to as great an extent as any one can have. I have been assured, heartily and generally, that if I would allow my name to be used for re-election there would not be a dissenting vote. This is very gratifying; but while I appreciate this honor, I do not believe it to be for the interest of your association that I should serve another term, or that any president should serve two successive terms. And I would suggest that you alter your constitution so that no man shall be president two successive terms. There is no lack of good material for the office. The president should be chairman of the executive committee. There is danger that some day the chairman of the executive committee will be riding in one direction and the president in another. Ex-presidents should be ex-officio members of the executive committee."

The principal business before the association was the question of adopting a uniform method for the settlement of joint freight accounts, and much progress was made in that direction. The subject has been under consideration by various territorial committees, and they reported a plan which was submitted to the meeting and considered in detail. After revision in committee of the whole the convention received the report and referred it to a standing committee of fifteen, which committee is to report on that subject and several other freight matters referred to it at the next convention. The report on settlement of joint freight accounts is as follows [for roads using audit office settlements]:

"1. Through way-bills for joint settlements through the accounting department not to show division of earnings from point of origin of way-bill to destination of same."

"2. The accounting department of the forwarding road to send, or cause to be sent, daily, to the accounting department of each road over which the way-bill is routed, a legible copy of each joint way-bill issued. To insure complete returns, the accounting department to also forward, or cause to be forwarded, to all roads over which the way-bill is routed, a daily memorandum giving date, number, origin and destination of all through way-bills made."

"3. The receiving road to be held responsible for the collection of the proper revenue, and to send correction notices to the accounting officers of all roads in interest for all errors discovered. If any exceptions are made to such corrections, roads so excepting to return notices to the accounting officers of the roads issuing same, with full explanation, stating their exception. For any errors discovered by forwarding road, such road to promptly issue corrections to all roads, as above, and if no exception is made by receiving road, the figures as corrected to be used in settlement."

"4. The accounting department of the forwarding road

to furnish the accounting department of the receiving road, on or before the 10th day of each month, with an abstract of all way-bills from stations on its line dated in the previous month, taking into consideration all corrections reported up to date."

"5. The accounting department of the receiving road to check and verify the forwarded abstracts, making such corrections upon the same as may be necessary, and then return same to the accounting department of the forwarding road so as to reach it on or before the 18th of each month, accompanied by a division sheet showing each road's proportion of the through earnings and balance due; and where more than two roads are interested the accounting department of the receiving road to also furnish the intermediate road, or roads, with copies of abstracts showing correct figures, together with copies of the division sheets."

"6. The abstract and division sheets as above rendered to constitute the basis of settlement."

"7. The receiving road to pay any intermediate road its proportion as shown to be due by the abstract and division sheets rendered by it, and settle with the forwarding road upon balances. A balance sheet or account current embracing all accounts to be settled between roads in interest to be rendered by the 23d of each month. Cash settlements to be made on or before the 25th."

"8. The receiving road to pay the intermediate roads their proportion of the through earnings, regardless of whether freight charges are prepaid or not; it being understood that prepaid amounts and charges advanced will be included in the settlement between the forwarding and receiving roads."

"9. Any road in interest may, if necessary, prepare a correction account to adjust any discrepancies found in the account as above rendered, and submit the same (together with a sufficient number of copies for all roads interested) to the accounting department of the receiving road, who should check the said statement of corrections without delay, and if found correct return same duly accepted to the road rendering same, furnishing the other roads interested with the copies also accepted, and include the same in the balance sheet or account current covering the first settlement thereafter. In case the receiving road desires to retain the original statement of corrections, it should advise the road rendering the same of its acceptance by letter or blank provided for the purpose."

"10. Where the amount of business done is large enough to justify it (the same to be determined by the roads in interest) drafts or remittances may be made weekly for approximate balances, the amounts to be agreed upon by wire or otherwise. Final payment to close the account to be made on or before the 25th of each month, as provided in section 7."

"11. Through way-bills under this agreement to be made to such points only as may be agreed upon by roads in interest."

"Furthermore, while submitting the foregoing plan it is not the intention to discourage or disapprove of any arrangement which individual roads or systems may make between themselves for the conduct of their joint business."

Other committees reported to the convention on various subjects, and the following addresses were delivered, viz:

By Mr. G. L. Lansing, Secretary and Controller Southern Pacific system, subject—"Division of operating expenses as between freight and passenger business." By Mr. C. P. Leland, Auditor Lake Shore & Michigan Southern, subject—"The annual reports of railways."

By Mr. C. C. Harvey, Vice-President and Comptroller Cincinnati, New Orleans & Texas Pacific, subject—"Railway taxation." By Mr. Carlton Hillyer, Auditor Georgia Railroad, subject—"Terms and phrases used in railway accounting."

By Mr. J. O. Clifford, Freight Auditor Chicago & Northwestern, subject—"The settlement of joint claims."

The following officers were elected for the ensuing year: President, M. Riebenack, Assistant Comptroller, Pennsylvania; First Vice-President, S. Little, Auditor, Pullman's Palace Car Co.; Second Vice-President, Cushman Quarrier, Comptroller, Louisville & Nashville; Secretary, C. G. Phillips, 22 Fifth avenue, Chicago; Executive Committee, C. Kelsey, Auditor, Chicago & Alton; J. C. Courtney, Auditor, Western & Atlantic; A. Douglas, Auditor, St. Louis & San Francisco; O. W. Mink, Comptroller, Union Pacific; and C. I. Sturgis, Assistant General Auditor, Chicago, Burlington & Quincy.

It was decided to hold the next meeting at New Orleans in the early part of next year, and the next annual meeting at Cape May, N. J., in July of next year.

The convention was in session two days, and much business was transacted in addition to that noticed above, all of which will be embodied in a printed report to be circulated among members of the association.

The Senate Committee Hearing on Canadian Competition.

The United States Senate Committee on Inter-state Commerce took but little testimony in Detroit, and met in Chicago on July 13, where it heard Traffic Managers Hanaford, of the Northern Pacific, and Reeves, of the Chicago & Grand Trunk. The former testified that Canadian competition injured the United States lines but little, and the latter said that his road obeyed the Inter-state Commerce law. On Monday, July 15, Secretary Stone, of the Chicago Board of Trade, testified at length. He said that

the Grand Trunk was the pioneer in the dressed beef trade, which was continually discouraged by American roads in the interest of their live stock trade and yard commissions. The Canadian lines were among the first to build and operate transfer elevators at Chicago for the preservation of identity and weighing of grain in hopper scales, as required by the law of the state, which law is now openly defied by some of the American lines. The Canadian lines have won the larger share of this business from the West by such and kindred measures, and by uniformly just and equitable treatment of their patrons, and not by favoritism. The Board of Trade deems additional legislation unnecessary, but wants the Inter-state Commerce Act enforced. The facilities for taking freight in bond through Canada should be fully maintained. Railroad traffic associations should be forbidden, as they destroy competition. When the speaker characterized the railroads as violators of the law through their associations, Senator Hiscok asked: "Whether the denunciatory sentences in your report are a deliberate opinion, or are merely rhetorical?"

No further hearings will be held at Chicago.

TECHNICAL.

Portable Oil Engine.

At the Royal Show, Windsor, Messrs. Priestman Brothers, of London, exhibit three types of their new oil engines using common mineral oils. The types shown comprise a 6-horse nominal portable engine. The special feature here is the application of this motive power in a portable form. The makers claim it to be the first introduction as such. As the engine requires no driver and but little attention, it appears likely to answer its intended purpose. The firm also show a 4-horse horizontal type driving a 50-light dynamo, illustrating the utility of the engine for this purpose. The general design has been improved upon, and the engine is now so constructed that every part is easily accessible. The third engine exhibited is a 1-horse power horizontal type similar in construction to the last, but it has an air-compressor mounted upon the sole plate at the end of the engine, and connected directly with it by gearing. This shows another application of the engine, which arrangement can be carried out for other purposes, such as pumping. An engine of 10-H. P. thus arranged has been put down a pit at the Bwlfa Dare Colliery, Aberdare, and has been working most satisfactorily for some time past, doing underground pumping at a cost of 10s. a day. An improved method of supply of electricity for ignition is also shown with the engine exhibited, by means of a small storage cell. The advantages of this improvement can be readily realized when it is considered that the cell is calculated to last for about three months without being recharged.

A Bridge at Quebec.

A project is on foot to bridge the St. Lawrence at Quebec, which, if carried out, will not only make one of the greatest bridges in the world, but will very materially affect the traffic of the two great railroads, the Grand Trunk and the Canadian Pacific. The depth and width of the river at this point have always been a serious obstacle in the way of bridging, but it is now proposed to build a cantilever bridge, which will cost in the vicinity of \$10,000,000. The width of the river from shore to shore at Quebec is 24,000 ft. Two main piers are to be constructed of granite in 40 ft. of water, about 500 ft. from either shore. The two piers are to support the cantilever bridge, 1,442 ft. long. The total length of the bridge, with approaches, will be 34,000 ft. The top of the bridge, from high water level, will be 408 ft. The principal object in building the bridge is to connect the Intercolonial from Halifax and St. John to Quebec, which is now being run by the government at an annual loss of nearly half a million dollars. This is the only line uncompleted necessary to give the Canadian Pacific an uninterrupted line from the Atlantic to the Pacific through Canadian territory.

Uniform Tests of Cement.

The Austrian Association of Engineers and Architects has recently published a pamphlet on a universal system for purchasing and testing Portland cement. In this system cements are divided into quick setting, medium and slow setting, the quick setting cement being defined as one which sets in 10 minutes in the air, while cements which take 30 minutes or more are considered slow setting. To secure perfect uniformity of tests the cement is brought to a standard consistency, and after this has been done the time of setting is ascertained. This consistency is tested by determining to what depth a brass rod one centimetre in diameter penetrates into newly mixed cement when weighted by 300 grams. If the rod sticks in the cement at a distance of six millimetres from the upper surface of the glass bottom of the box in which the specimen is placed, the consistency of the cement is standard; if not, a fresh trial must be made with cement mixed with more or less water. Engineering states that an English engineer has recently devised an automatic method of ascertaining the time of hardening, but no description of the method is given. For ascertaining the binding power the Austrian committee recommends that the experiments should be made on mortar prepared with a standard sand. This sand should be quartz, thoroughly washed and dried, and passed through a sieve of 64 meshes per square centimetre, about 412 per square inch. The portion passing through is again sifted through a sieve having 928 meshes to the square inch. That which remains in the sieve is standard sand. Both tensile and compressive tests are recommended. For compressive tests the committee of the association recommends cubical specimens, each face having about 7.76 sq. in., these tests to be made 24 days after setting.

The Muscote Dam.

It is said that the Department of Public Works of New York City has let a contract to John McQuade to build Reservoir A, on the Muscote branch of the Croton River, for \$540,610, the work to be finished in 700 days. The specifications call for a dam 90 ft. high and 1,400 ft. long, built of earth, with a masonry heart. The capacity of the reservoir will be 7,000,000,000 gallons.

A Bridge Trust.

A Western newspaper has discovered what it calls a bridge builders' trust. It is said that the territory covered by the trust comprises Southern Iowa, Nebraska, Northern Kansas and Northwest Missouri. It appears that the alleged trust is simply an agreement to keep up prices in that district, an object which nobody who understands the condition of highway bridge building will be likely to consider very wicked. It does not seem probable, however, that such a combination can be maintained very long.



Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The outcome of what has been called in Indian journals the "battle of the brakes," is a setback for the Westinghouse interest in that country. It is said now that the Indian government has decided to adopt the automatic vacuum for all state railroads, and has sent to England an order amounting to about £43,000, and will place further orders as soon as more funds are available. The letter from India, which appears in another column, and the comments of the technical journals of that country, leave us to understand that there is considerable dissatisfaction with the decision, and a pretty general idea that the government has chosen the inferior system, quite irrespective of the merits of the devices or the results of the trials that were made. In this feeling we must share. The exhaustive experiments which have been made in this country in the last two years with the quick acting brake, as well as the recent trials at Carlsruhe, the excellent service that it is doing now in daily use, under all sorts of conditions of grades, speeds and weights of trains, all have demonstrated that for all around service, on grades and on the level, for heavy and light, and for slow and for fast trains, it is much the most efficient and reliable brake in the world to-day. In view of what has been done elsewhere the Indian trials seem trifling, and the result is absurd.

The results of the use of the two-wheeled radial truck on the Mogul type of locomotive in fast passenger service are of increasing interest. So far as we can ascertain the guiding action of this class of truck is quite as satisfactory as with the four-wheeled truck. The front drivers show no more flange wear, and the truck wheel flanges are not worn as much as with many four-wheeled trucks. In one instance a fast Mogul engine showed but little abrasion of the surface of the flanges of the wheels of the two-wheeled radial truck after running many thousand miles. There is, however, one result that is instructive, and should be noted by all who propose to use this design; it is that the side area of bearing of the wheel hub against the face of the axle box is in most cases too small. It is, in fact, just one-half what it is for a four-wheeled truck for the same side pressure. In order to prevent heating and excessive wear both the hub and the box should have as large surface as possible, and provision should be made to permit a liberal supply of oil to the surfaces. There are many advantages resulting from the use of a two-wheeled radial instead of a four-wheeled bogie truck in the matter of weight and complication, and if, as seems to be the case, the two-wheeled will answer all requirements as well as the four-wheeled truck, it has a future before it. Actual trial and experience can alone settle the question of the greater desirability of either form; however, the tendency to a reduction of weight upon the trucks of locomotives, in order to reduce the total weight and to remove the reason for the application of brake shoes to those

wheels, points towards the possibility of using two-wheeled trucks with satisfaction. There are several designs of original forms of radial axle boxes exhibited at the Paris Exposition, some of which are simpler than those illustrated in the mechanical papers. The use of the radial axle box removes the radius bar from a radial truck, and considerably reduces the number of parts and the consequent repairs—particularly is this the case in the detail known as the "radius bar fulcrum pin."

The amount of attention which is being devoted to compound locomotives in France, Belgium, and other continental countries can be best appreciated by an inspection of such locomotives exhibited at the Paris Exhibition. It is not enough to say they are receiving a very thorough trial. It is far more exact to state that they are being built in nearly all conceivable forms, and are becoming standard on continental railroads. At the exhibition there are a greater variety and a larger number of locomotives of the double expansion type than have ever been collected together before; and also many which have never been illustrated or described in any of the technical journals. For the information of those who have followed the discussions on the compound locomotive, and as bearing especially on the question of the power of the compound in starting heavy trains, we call attention to one design which is perhaps worthy of more attention than any of the others at the Exhibition. It is a locomotive constructed for the Northern Railroad of France under the directions of M. D. Banderli. This locomotive is one of the most scientific of any of the compound locomotives yet built. It has far more cylinder power, in proportion to the weight upon drivers, at starting or while running than the average American locomotive. In fact, from the standpoint of American railroad designers, it would seem to have too much power to rotate the wheels, and therefore would be liable to skid them to a detrimental degree. However, one must remember that the conditions of railroad service on the Continent are quite different from those in the United States, and that the engine-runner is always a machinist, and generally an experienced and careful man, and an observer will seldom see locomotives abused. The locomotive in question is of the Mogul type, having three cylinders connected to the same axle, with cranks at an angle of 120 degrees to each other. The steam pressure carried is about 210 lbs. per square inch. The drivers are 65 in. in diameter. The single high pressure cylinder is 18 in. in diameter. The double low pressure cylinders are 19.7 in. in diameter, and are arranged to be worked with high pressure steam when required. The wheels are connected by parallel rods, and the forward axle is a crank axle. The stroke of the cylinder is 27.6 inches. A very simple calculation will show that the cylinder power of this locomotive at starting is enormous in proportion to the weight upon drivers—90,944 pounds—and that there can be no question regarding the utilization of the whole weight available for adhesion while starting trains. This is not an isolated case of the great power of compound locomotives of recent design in starting trains; all of the compounds exhibited as representatives of those now in use are remarkable for the high pressures of steam and great cylinder power. In fact, a simple statement covers the whole point, and puts the facts regarding the power of locomotives in starting trains in a nutshell. It is that, when provision is made for the entrance of high pressure steam into the low pressure cylinders, the greater the degree of expansion the greater will be the power of the cylinders to rotate the wheels, and, therefore, because the compound is, by design, purpose and intention, a locomotive of high grade of expansion it is necessarily one of great power when the full pressure of steam is admitted to the low pressure or large cylinders, as is the case with all of the later designs when it becomes necessary to start heavy trains.

The improvements that have been made in the manufacture of truck wheel and driving tires during the last few years have resulted in the production of more uniform texture, and freedom from internal strains. This is well shown by the exhibit of the tire manufacturers at the Paris Exhibition, and is corroborated by the experience of railroad men on the Continent. The results of these improvements have had their effect upon the use and production of special shapes of tires, and now there is little or no difference noticeable in the wear or service obtained from tires of different sections. Breakages are as frequent with the one as with the other; and designers of special wheels have no fear of disastrous results from the use of tires having grooves or internal ribs. That this is a desirable improvement can be seen by examining the results of the use of tires

with and without internal ribs, as shown by an investigation by German railroad officers on the use of such tires in Germany, a portion of which was published in the *Railroad Gazette*, July 15, 1887. It is most satisfactory to note this improvement in tire manufacture, because in the United States there are a great many wheels in use having tires with internal ribs, and it would not be flattering to think that in the matter of truck wheels we were moving in the wrong direction, particularly as we like to think that we so well understand the proper manufacture and care of truck wheels that we have been enabled to use the chilled cast iron wheel with the most satisfactory results under conditions more difficult to meet than those which exist in other countries, where it has been found necessary to adopt steel or wrought iron as a material for such construction. Tire manufacture has evidently been much improved in the United States as well as abroad, and further improvement is expected as a result of the investigations made by the engineers of steel works who are traveling abroad this summer with commission to study the manufacture of that class of material in Belgium and Germany. In reply to private inquiry among those railroad companies in the United States who are using special classes of tires, we note the unanimous statement that at the present time there is no difference in the service obtained from, or in the number of breakages of truck wheel tires of plain section and those having special contour. We have in preparation some results of experiments made with various forms of tires with reference to a determination of the deflections of such tires under a given load, which we hope to give to our readers at an early date.

On the occasion of the recent prize fight at Richburg, Mississippi, a special train was run from New Orleans over the New Orleans & North Eastern for the accommodation of the rowdies and their friends, and it is said that other special arrangements were made by the officers of the Queen & Crescent system for one or both of the parties. The Governor of Mississippi, who threatened to prevent the fight but failed to do so, now says he will prosecute the railroad company and endeavor to annul its charter because it has aided and abetted a prize fight, which the statutes declare to be a misdemeanor and punishable by fine and imprisonment. The newspapers commend the stand taken by the governor, and say that he ought to succeed if he doesn't. We do not know the circumstances well enough to judge of the motives of the railroad officers who carried out these transactions, but it is doubtless fair to assume that in this as in other parallel cases the question of responsibility must be decided wholly upon moral lines. A superintendent or general passenger agent, who has a burning desire for business, and does not particularly object to prize fights, probably has little difficulty in any case in adapting his theory to his practice. As a common carrier he must transport all persons who apply and tender payment; to refuse them he would lay himself liable to prosecution; to inquire closely concerning passengers' business or motives would be impertinent and unwarranted. On the other hand, one who clearly saw the disgrace involved in dealings with pug-uglies and gamblers, and who was desirous of frustrating their plans as much as possible, even if at the expense of some revenue (that would be lost), could doubtless readily find ways to put his wishes into effect. It is said that the officers of the law, when they asked for a special train to pursue the criminals, were met with the statement that the equipment was all engaged. The railroad officer who made this plea could no doubt have arranged without much trouble to make the same excuse to the law-breakers. In deciding on the rightfulness of one or the other of the two courses above outlined a judge often has to be guided substantially by the standard of the Dutch justice, who settled the melon stealer's case by telling him (in the absence of conclusive evidence), "I decide that you are guilty because it is so much like you." However much we may laugh at the crudity of the law in this case, we must all admit that the principle generally furthers the ends of justice. As for railroads, the Mississippi case is only a pronounced example of a very common state of affairs. Horse-racing tracks of the vilest character are encouraged (indirectly, it may be) in more than one case by railroads nominally law-abiding. Sunday excursions patronized chiefly by roughs who conduct base-ball games of a character condemned by all decent people are morally the same as prize fights in kind, though not in degree. While as agent of an impersonal corporation and as a reputable citizen a man may claim to be actuated by contrary theories, it is pretty contemptible business for him not to let it be clearly known which of the theories he would prefer to follow; and all court decisions of

the higher class virtually demand this standard of conduct. What is the United States regulation requiring railroads not to transport empty casks on which are uncanceled revenue stamps, but a requirement that officers and agents actively support the government in repressing frauds upon the revenue? Why do so many roads instruct conductors to suppress gambling on trains? Simply because it is necessary in order to meet the sentiment of the respectable passengers. It would be easy to take the opposite position and say that evidence to convict could not be obtained, but it is recognized that that would not pay. Railroads should be consistent.

Can a Railroad Trust be Successful?

The partial failure of the Inter-state Commerce railway agreement has caused renewed talk of a railroad trust. We do not ourselves believe that anything will come of it, but so much is said on the subject that it is worth discussing. Let us begin by defining our terms so as to make it clear what we mean by them.

A pool is a contract between certain railroads to divide certain traffic or the receipts from that traffic. It primarily affects the commercial department of the roads.

A trust is an arrangement for securing permanent harmony in the administration of different companies by rendering it impossible that they should act independently. It primarily concerns the board of directors and the financial department. A clearing-house arrangement, with a division of earnings, is not a trust, though it is often called by that name in the newspapers. It is simply a highly developed pool.

A consolidation is a union of investors' interests in two roads under well-defined terms. Such union may virtually be brought about by lease, where one company agrees to pay the stockholders of the other certain more or less definite amounts of money; or it may take the form of complete reorganization of one or both companies, with union of the securities of the two. In either case it directly affects the investors as such.

A trust therefore stands in many respects half way between a pool and a consolidation. The community of management in a trust is obtained by an exchange of a controlling interest in the stock of the different roads for trust certificates. A trust certificate is to all intents and purposes a share of stock minus its voting power. The roads and their organizations may remain more or less separate; but the votes which control the management of those roads are combined in such a way that no quarrel can ever arise, at least so long as the trust agreement remains intact.

A trust has an advantage over a pool in not being directly prohibited by the Inter-state Commerce law. It has an advantage over a consolidation in not requiring a special act of the legislature to sanction it. This has been the chief reason for the growth of manufacturing trusts. Direct consolidation required a special act and special proceeding to secure that act. If a minority of the stockholders were opposed to such legislation, they were often able to defeat it. On the other hand, by simple exchange of stock for trust certificates the same result could be accomplished more quietly. Community of management could be secured with an apparent separation of the different concerns in their relations to the outside public. The public deals with Pratt, with Devoe and a large number of other oil refineries; the Standard Oil Company simply insures that these different concerns shall act in harmony with one another, and obtrudes itself upon the public as little as possible.

There can be no question that it is easier to arrange a trust than a consolidation. But will it prove as effective? We think not. There are special reasons which will make it hard for railroads to follow the example of manufacturing enterprises in this matter.

In the first place, it is harder for them to keep their doings quiet. A much greater share of publicity has been enforced for railroad corporations than for manufacturing companies. If a minority of the stockholders of any of the roads concerned were opposed to such a change they would be sure to make themselves heard; and such minorities would surely exist. There would certainly be some people who would oppose any such change, even if it were only because they had a speculative interest in depreciating the value of the stock. Apart from any such internal opposition, the newspapers themselves would be only too glad to proclaim what was going on. The attempt at secrecy, so far from protecting the managers from the public gaze, would cause their intentions to be spread abroad in the most exaggerated form. It is doubtful whether any railroad could afford to defy public opinion in this way. In most instances they would be checked by a force sharper, if not stronger, than public opinion. There

would be little difficulty in inducing both legislatures and courts to throw all sorts of obstacles in the way of a railroad trust. If Congress could pass a law against pools, it certainly could and would pass a law against trusts. Even before any such legislation was actually carried through, it is likely that courts would interpose obstacles in their way which would make such agreements quite ineffective. There is a strong and, on the whole, a well-founded distrust in the judicial mind of the system under which one corporation controls another by holding a majority interest in its stock. When a combination was formed with that specific purpose in view, the distrust would be vastly increased; and when the result was sought with the almost avowed object of evading one of the clauses of the Inter-state Commerce act, the average court would stretch every legal point against the trust and in favor of everybody, whether inside or outside, who was trying to oppose it.

We have said before, and we still say, that the effect of prohibiting pools must in the long run be to increase railroad consolidation. But we do not believe that prohibition of pooling can be evaded by forming trusts. It will probably be in the long run easier to secure actual consolidation of rival or independent systems, even though the initial steps may seem so much harder. A consolidation which actually stands is worth ten times as much as a trust which totters from the beginning and takes the first opportunity to fall to pieces.

Gasoline in a Wreck.

It is not often that a railroad officer has so good an opportunity to study the phenomena of a wreck as was given to one of the officers of the Norfolk & Western in the recent serious accident at Thaxtons, on that road. Our readers will remember that on the morning of July 2, before daylight, a train ran into a washout, was wrecked, and the wreck took fire. Some 20 lives were lost. An officer of the road, who was a passenger on the train, was caught between the upper and lower berths of the sleeper in which he was traveling, and held there for fully an hour while the passengers were being taken out. His position was such that he could see the locomotive and all of the cars of the train. As he lay there he saw the coals slowly dropping from the fire-box, and it is said that "he was especially interested in watching them, as he dreaded the fire" which he felt sure must start from them sooner or later. Fortunately he was rescued, and an hour and a half after the wreck occurred this officer and the Pullman conductor saw the dreaded fire start from the locomotive. They were unable to extinguish it, and it spread rapidly.

We publish this incident of the wreck principally for its bearing on what follows, but it is valuable as illustrating the strong sense of duty to the interests in their charge which is so commonly found among railroad officials and employees. As the story was told to us no emphasis was laid on the fact that this officer was not rescued until every passenger who could be found had been taken out of the wreck. That was considered a matter of course. It was not thought extraordinary or worth bragging about. No comment can add to the impressiveness of such facts.

The use of this incident for our present purpose is in the valuable evidence which it supplies as to the actual cause of the fire which consumed the wrecked cars. A press dispatch shortly after the accident said that "the locomotive boiler and a gasoline lamp exploded by the shock, and the entire train was wrapped in flames in an instant." This dispatch was of the character of those which are "important if true," but its improbability was so apparent that we gave it no further attention than to make inquiries, and to learn that it was not true. It appears, however, to have obtained some credence; and the use of gasoline on the train, and the explosion of a lamp, are held to have been sufficient to explain "why the entire train was wrapped in flames in an instant."

From the best evidence we have (and it is pretty good evidence), it appears that the phenomenon thus explained did not take place, and that the conditions explaining it were not present. That is, the train was not wrapped in flames in an instant, but one car of the train was lighted with gasoline, and there was no explosion either of a lamp, a carburetter, or of the locomotive boiler. The officer of the road, of whom we have spoken above, says that the fire in the wreck started one hour and a half after the accident occurred. He and the Pullman conductor saw its origin at the locomotive. He noticed while lying in the wreck that there were no lights in the wrecked cars; the only lights burning were those in the Pullman, left standing on the bank. Passengers who were in the wreck state that all the lights were extinguished instantly when the accident took place. The five carburetters from the car which was lighted with

gasoline were taken from the wreck and are now at the shops of the company at Roanoke subject to examination by any one who is interested in knowing the facts. It is said that none of them show any signs of explosion. All of these statements are given on good authority, and as they now stand are conclusive. We see no reason to doubt their truth, but, on the other hand, they are intrinsically probable. At the same time we shall try to get further evidence in the matter, for we have no theory to sustain, but wish to get at the facts.

The "dry carburetter" system of gasoline lighting has been characterized as highly dangerous, and the baseless dispatch quoted above was seized upon as sustaining that theory. In discussing the system recently we came to the conclusion that "the dry carburetter system is not so unsafe as to warrant its rejection when its advantages are considered." We do not consider the system the safest now in practical and successful use, although it advocates even claim that much for it, but we do consider it so reasonably safe that any railroad company would be justified in using it, and indeed ought for reasons of safety as well as for comfort and cleanliness to use it in preference to oil. So far as the Thaxtons accident proves anything with regard to the use of this system of lighting, it sustains our conclusion. The carburetters were distorted and dented, and the soldered joints were opened by the heat to which they were subjected; but they did not explode, which is precisely the result to be expected. The damage from fire was apparently done before the gasoline could add anything to the flames, which is precisely what we anticipated would happen. The burners in the cars were at once extinguished by the shock, as any one would predict.

As our only object in this matter is to ascertain and make known the truth, we shall be glad to get any further evidence and to publish that which is important.

June Accidents.

Our record of train accidents in June, given in this number, includes 33 collisions, 42 derailments and 4 other accidents; a total of 79 accidents, in which 35 persons were killed and 102 injured.

These accidents are classified as follows:

COLLISIONS:		
Rear.....	15	
Butting.....	11	
Crossing and miscellaneous.....	7	
	33	
DERAILMENTS:		
Loose or spread rail.....	1	
Broken bridge or trestle.....	1	
Loose frog.....	1	
Broken wheel.....	1	
Broken axle.....	1	
Misplaced switch.....	4	
Bad switching.....	2	
Cattle on track.....	6	
Washout.....	1	
Malicious obstruction.....	1	
Unexplained.....	30	
	42	
OTHER ACCIDENTS:		
Cylinder explosions.....	1	
Broken axle.....	1	
Broken wheel.....	1	
Car burned while running.....	1	
	4	
Total number of accidents.....	79	

The causes of collisions, where given, were as follows:

	Rear.	Butting.	Crossing.	Other.	Total.
Trains breaking in two.....	2	2	1	2	7
Misplaced switch.....	2	1	1	4	8
Failure to give or observe signal.....	2	1	1	4	8
Mistake in giving or understanding orders.....	4	3	2	9	18
Miscellaneous.....	5	6	1	12	24
Unexplained.....	15	11	7	33	66
Total.....	33	24	11	48	116

A general classification shows:

	Col- lisions.	Derail- ments.	Other.	Total.	P. c.
Defects of road.....	3	6	3	12	15
Defects of equipment.....	18	6	3	27	34
Negligence in operating.....	12	8	1	21	26
Unforeseen obstructions.....	12	20	1	33	41
Unexplained.....	33	42	4	79	100

The number of trains involved is as follows:

	Col- lisions.	Derail- ments.	Other.	Total.	P. c.
Passenger.....	11	22	3	36	45
Freight and other.....	43	21	1	65	82
Total.....	54	43	4	101	127

The casualties may be divided as follows:

	Col- lisions.	Derail- ments.	Other.	Total.	P. c.
KILLED.					
Employés.....	7	11	..	18	51
Passengers.....	..	6	..	6	17
Others.....	9	2	..	11	32
Total.....	16	19	..	35	100
INJURED.					
Employés.....	13	36	..	49	48
Passengers.....	..	49	..	49	48
Others.....	3	1	..	4	4
Total.....	16	86	..	102	100

The casualties to passengers and employees, when divided according to the classes of causes, appear as follows:

	Pass. killed.	Pass. injured.	Emp. killed.	Emp. injured.
Defects of road.....	3	13	1	7
Defects of equipment.....	..	9	..	1
Negligence in operating.....	..	10	..	18
Unforeseen obstructions and maliciousness.....	3	4	..	11
Unexplained.....	..	13	..	12
Total.....	6	49	18	49

Fifteen accidents caused the death of one or more per-

sons, and 21 caused injury but not death, leaving 43 (54 per cent. of the whole) which caused no personal injury worthy of record.

The comparison with June, 1888 and 1887, shows:

	1889.	1888.	1887.
Rear collisions.....	15	33	26
Butting ".....	11	23	12
Crossing and other collisions.....	7	8	5
Deraillments.....	42	76	42
Other accidents.....	4	3	3
Total.....	79	143	88
Employés killed.....	18	30	13
Others.....	17	10	3
Employés injured.....	49	67	37
Others.....	53	58	63
Passenger trains involved.....	36	51	32

Average per day:

Accidents.....	2.63	4.76	2.93
Killed.....	1.47	1.33	1.87
Injured.....	3.40	4.17	3.33

Average per accident:

Killed.....	0.443	0.280	0.182
Injured.....	1.291	0.874	1.136

The most fatal accident of the month was the collision at Latrobe, Pa., on the 26th, where a dozen or more were killed, but the majority of the victims were persons stealing rides, so that public interest in their fate and its causes was but moderate. But howsoever general may be the feeling that the loss of a few tramps is of more good than harm to the world, no railroad officer desires to have them killed on his road, and it becomes a serious question how to keep them off from trains. Where trains of 30 cars (and much longer) are common they always have the advantage. The conductor and his men could not possibly watch every car, even if they had nothing else to do, and nothing is easier than for a half dozen bummers to get in or upon the cars, especially at night, in positions where only a slow search will detect their presence. Add to this the feeling of the trainmen that ugly ruffians who have been crowded off the cars are quite likely to stone the trainmen (if they do not wreck the train) and the likelihood of starting a train free from intruders is very slim. Idle fellows with an insatiable desire to go somewhere seem to infest all parts of the country, and any one reading all the items in our accident reports must have been struck by the frequency with which "a tramp stealing a ride was killed" appears in connection with freight train accidents of the more serious class. There seems no way to keep these fellows off from trains except by excluding them from the railroad premises; and this problem of exclusion must be considered in connection with the more general one of keeping off all people who have no business on or with the road. This in turn is difficult, because so much depends on the municipal or state authorities. Railroad companies cannot with any success undertake to maintain an orderly state of affairs along the narrow strip of territory subject to their control so long as local officers permit the vagrants to circulate throughout the adjoining country with little or no restraint. Much of the walking upon railroad tracks is by people who are substantially law-abiding, but they stick to this precious privilege, dangerous as it is, as though it were one of the main points of the Declaration of Independence. Until they come to the point of cheerfully traveling the lawful highway, and allowing railroad premises to be kept separate for their proper use, as in European countries, public sentiment, which they help to form, will be loose, and pedestrians will continue to be run over. Perhaps if local magistrates and police officers were to tighten the grip of existing laws, it would give some wholesome enlightenment to public sentiment, and stimulate it to a stricter standard. When respectable people stop getting killed by reckless behavior on railroads, it will be easier to keep others from doing it. Railroads would benefit by such a reform, and they should therefore urge it forward.

The derailment of a fast express near New Haven, Conn., the 29th, is classed as from a defect of road, but it is, unfortunately, clearly attributable to the negligence of the section master, in not securely fastening a frog. As we observed at the time, an important desideratum in a serious case like this is an independent, intelligent and public report. One of the valuable features of the English government of officers' investigations is their minute inquiry (as, for instance, in a case like this) into the record and reputation of the section master and a good diagnosis of his character. The custom of the road in hiring for or promoting to this position, and any other matters found to be of interest, are also brought out. Now, however useless this may be to the officers of the road being investigated, or howsoever little use may be made of the information by the legislature or the officers of the law, it must be admitted that there are on all sides railroad officers of numerous grades who could be materially benefited by experience lessons of this sort, and who would, if rightly led up to it, gladly avail themselves of them. This is why more publicity is necessary. A derailment by a misplaced switch at Emmett, Mich., the same day, might have been as bad as this one, the speed having been about 40 miles an hour, but by great good fortune no one was killed.

Cattle on the track caused considerable havoc this month, and in one case this cause was aggravated by a kind of carelessness which was noted a month ago in a very similar case, to wit, the carrying of passengers—the men were laborers, and treated about like a gravel train gang, but they appear to have been passengers nevertheless—in a manner known to be unsafe. In the present case (Pratt Mines, Ala., 18th) the lack of a bell-cord contributed to the disaster, and the testimony of the trainmen indicated that they indulged generally in practices which they knew to be unfavorable to the safety of passengers. Apparently their superiors did not disapprove of this.

The derailment at New Cumberland Junction, W. Va.,

the 19th, was reported as resulting directly from fast running on a curve not adapted to high speed. While we have no authentic information about this case, its occurrence is significant, and should serve as a reminder that the tendency to "make better time," which is constantly spreading, may easily go too far, and that it will bear close watching. There is no doubt that many a curve is passed every day at speeds which reduce the margin of safety much lower than it ought to be.

Hungarian Passenger Rates.

The new Hungarian state railroad tariff is one of the most curious affairs ever devised. For very short distances the rates are extremely low. They then increase faster than in proportion to the distance, until a maximum is reached at about 140 miles. From that point additional distances are charged nothing whatever; in other words, the traveler is carried free for such additional distances, even though they may amount to hundreds of miles.

On accommodation trains the tariff for the several classes and distances, starting from Buda-Pesth as a centre, is as follows:

	First class kr.	Second class kr.	Third class kr.
To the first station.....	30	15	10
" " second ".....	40	22	15
Zone 1..... 1 to 25 kilom.....	50	40	25
" 2..... 26 to 40 ".....	100	80	50
" 3..... 41 to 55 ".....	150	120	75
" 4..... 56 to 70 ".....	200	160	100
" 5..... 71 to 85 ".....	250	200	125
" 6..... 86 to 100 ".....	300	240	150
" 7..... 101 to 115 ".....	350	280	175
" 8..... 116 to 130 ".....	400	320	200
" 9..... 131 to 145 ".....	450	360	225
" 10..... 146 to 160 ".....	500	400	250
" 11..... 161 to 175 ".....	550	440	275
" 12..... 176 to 200 ".....	600	480	300
" 13..... 201 to 225 ".....	700	530	350
" 14..... 226 kilom. and over.....	800	580	400

These figures are given in kreutzers, which at the present rates of exchange are equal to a little less than four-tenths of a cent. Express fares are about 20 per cent. higher in every case. The abstract before us gives no clear account of the schedule of rates when the journey does not begin or end at Buda-Pesth.

Reducing some of these figures to American standards we find the aggregate charge and the mileage rate for different distances to be as follows:

FIRST-CLASS—EXPRESS.		
Distance, Miles.	Total charge.	Rate per mile, Cents.
15.....	\$0.24	1.60
25.....	0.48	1.92
50.....	1.20	2.40
100.....	2.64	2.64
150.....	3.84	2.56
250.....	3.84	1.54
THIRD CLASS—ACCOMMODATION.		
Distance, Miles.	Total charge.	Rate per mile, Cents.
15.....	\$0.10	0.67
25.....	0.20	0.8
50.....	0.50	1.0
100.....	1.10	1.1
150.....	1.60	1.07
250.....	1.60	0.64

The maximum mileage rate, as well as maximum total charge, is reached at 140 miles in each case.

It may be asked how the Hungarian Government came to adopt such a strange and almost absurd tariff. The answer is somewhat as follows: In the first place the Hungarian state roads were doing badly under the old system. Their passenger earnings per mile fell from \$1,300 in 1887 to \$1,000 in 1888, at the very time when other roads in that same general district were showing an improvement. The advocates of any change could therefore point out that things were about as bad as they could be under the old schedule. They further showed the proportion of seats occupied was ridiculously small, and urged that it was time to try some reform which should fill the cars, even at great reduction of *per capita* rates.

Both in Germany and in Austria there have, for a long time, been theorists, who advocated a system of "zones" or group rates in passenger traffic. The majority of these writers contemplate the adoption of only a few zones, perhaps two or three. The idea would be that any man should pay, say 25 cents for short distances, \$1 for moderate distances, and \$3 for long distances, independent of the exact mileage in each case. Any railroad man can see how great would be the difficulties of a system like this. The Hungarian railroad men, while not resisting the idea, strove to put it in more practical shape by increasing the number of zones or groups.

They further readjusted matters in such a way as wholly to disregard cost of service, and base relative rates upon what the traffic would bear. Two kinds of passenger traffic can be largely increased by low rates—that for very short distances and that for very long distances. In each of these cases they made the mileage rates much lower than for moderate distances, over which traffic is more nearly constant. For both short and long distances, in fact, they have brought regular rates about down to the commutation rate level.

In making a readjustment of this kind the authorities did not dare to raise rates anywhere. There would have been too much local clamor against such a policy, no matter what the actual business conditions might be. All rates had to be reduced somewhat; and, in consequence, where the relative reduction was greatest, the final result was necessarily very low indeed. Low rates arbitrarily adjusted to develop business, without regard to cost of service, usually prove pretty good business policy; but we shall be surprised if the Hun-

garian State can make money, or even hold its own, at the figures given in the table.

The form of returns to the Inter-state Commerce Commission for 1889 does not greatly differ from that for 1888. The most obvious alteration is a change in type, which forms a decided improvement. The financial returns show on the whole the most material change. A special form is provided for roads not making operating returns. Extra space and attention is given to the account of car trust obligations. The general account of financial operations for the year (old form p. 19, new form p. 26) has been rearranged and itemized in an admirable manner. Whoever did this deserves great credit. The returns of traffic and operations vary but little from the old form. A few points are made more explicit; notably, the separation of trackage rights from mileage regularly operated. The schedule of accident statistics has been wholly remodeled. A supplementary page of "Questions for General Information" asks about sinking funds, leased terminals, traffic associations and fast freight lines. We should rather like to know who expects all these questions to be answered on one page.

The accident form is calculated to secure valuable information concerning the number of persons killed and injured, though the classification of causes is imperfect and the classification of persons should be enlarged. This will clearly appear when the form is put in use. "At highway crossings" evidently is not to include "overhead obstructions," though these occur at crossings (overhead) oftener than elsewhere. "Falling from trains" and "overhead obstructions" should be applied to "passengers" and "others" as well as to employees. Train accidents are not to be reported, the number of cases or their importance being nowhere shown except as the latter may be inferred from the number of casualties. It would be of interest to railroad officers, at least, to be informed on this point; and the approximate money loss by each train accident could be reported without much trouble, though, of course, exact figures would be out of the question. In fact, why not "go the whole figure" and adopt the English form of accident return entire?

Prof. R. T. Ely, in the July number of the *North American Review*, advocates a government telegraph for the United States. He complains not merely of the dangers under the existing system, but of the actual results. He implies that it is unfair to grade telegraph charges according to distance, and thinks that if England or Germany has a low rate for the whole country, the United States ought to have one about as low. To this there are three answers: First, that the more scattered population of the United States makes it harder to organize a cheap telegraph service, independent of questions of distance. A country with five million acres and one million of people could not expect as cheap service as one with five million people on the same area. Second, that charges are graded according to distance in Europe, as well as in America. The small countries, like Belgium or Switzerland, have the lowest rates. Moderate-sized countries charge more; while on international traffic, which is the only long-distance traffic of Western Europe, the rates are higher than those in America. For instance, counting eight words for address and signature, we have the following rates for corresponding distances in Europe and America:

	Ten words, address and signature, Cents.	Each additional word, Cents.
Berlin to Vienna.....	43	2½
New York to Pittsburgh.....	25	2
Berlin to Paris.....	64	3½
New York to Cincinnati.....	40	3
Berlin to Rome.....	86	4
New York to St. Louis.....	40	3
Berlin to Madrid.....	107	5
New York to Denver.....	75	5

Finally, the average rate in the United States, instead of being 50 cents for ten word messages, as Prof. Ely implies, is less than 37 cents for all messages; while the German rate for all messages is almost as great as that, though German messages probably average shorter than American and are sent over shorter distances. Without pretending that our telegraph service is all that it ought to be, we doubt whether a government telegraph would do as well for us.

A superintendent says the employees who are the most interested do not ask for any improved car couplers. This seems to be about correct. The brakemen who are killed should be the ones the most interested. No one ever heard of a dead brakeman asking for an improved coupler! The logic of this superintendent is very convincing.—*Railway Service Gazette*.

The application of the above lies in the truth of it. That superintendent is, unfortunately, numerous. Nothing is more familiar among railroad men than that such and such men who made a false motion or a misstep, and lost hands or legs, were old and experienced, and reputed to be the best men in the service; and yet these men's opinions, before they are hurt, are accepted as incontrovertible truth. They know that they have become very dextrous in the use of link and pin couplers, and they therefore compare such couplers with those which require no manipulation whatever, and their decisions are accepted by the superintendent. In point of fact there can be no real comparison whatever on the lines adopted by the brakeman. It is just as senseless as the stand taken by the hand laborer who combines with his fellows to destroy a labor-saving machine, and the actual grounds of comparison are about as fallacious in one case as the other.

Since the publication in our last issue of the record of new track laid in the United States, Canada and Mexico we have received corrected returns from some companies and new

returns from others, so that the totals as given in the table and summary by states need correction. The total track laid in the United States in the first six months of 1889 amounted to 1,481 miles; in Mexico 165 miles, and in Canada 106 miles. The total new track laid during the half year in the three countries was 1,752 miles. This track was laid by 122 different companies on 146 lines; the average length built by each company was a little over 14 miles. The longest line was 140 miles long, built by the Georgia Pacific in Mississippi.

The new track laid is, by states, as follows:

Alabama.....	17.8	New Jersey.....	23.8
Arkansas.....	3	New York.....	84.8
California.....	46.6	North Carolina.....	108.5
Colorado.....	74.3	Ohio.....	54.1
Connecticut.....	0.5	Pennsylvania.....	31.7
Dakota.....	27.1	Tennessee.....	86
Georgia.....	115.2	Texas.....	112
Florida.....	31.1	Virginia.....	60
Idaho.....	7.1	Washington.....	56.1
Illinois.....	13.8	West Virginia.....	24.8
Indiana.....	19		
Indian Ter.....	32	Total U. S.....	1,481
Kansas.....	25.2	Manitoba.....	52
Kentucky.....	65	New Brunswick.....	11.2
Louisiana.....	73.5	Nova Scotia.....	3
Maine.....	3.3	Ontario.....	40
Maryland.....	1.8	Mexico.....	132.8
Michigan.....	14.5		
Minnesota.....	28	Total foreign.....	271
Mississippi.....	140		
Missouri.....	55.6	Grand total.....	1,752
Montana.....	43.9		

The Baltimore & Ohio has organized a Storekeeper's Department to include the care of all materials and stores on the entire system, and G. W. Valiant, formerly Chief Clerk of the Machinery Department, has been appointed General Storekeeper, reporting to the General Manager. The materials and stores of the company have heretofore been in charge of the Machinery Department, but the new department will be distinct from all others. A new system of accounts for the operating departments is also being introduced by this company, with the advice and under direction of Major H. D. Bulkley, an expert accountant, who has been employed by the Board of Directors for over a year in going over the entire records of the company and adjusting the accounts.

The Philadelphia & Reading continues its struggle for an elevated way out to the heart of Philadelphia. The latest phase is shown by its having secured building permits for the erection of a viaduct between Willow, Division, Callowhill and Carlton and Eleventh streets. These permits do not allow bridging of the streets. It is not thought that the company will be permitted to cross the streets without further authority. The latest information concerning the matter is that the Reading Iron Works will be put to work on the structural material for this improvement.

NEW PUBLICATIONS.

Machine Locomotive, à Grand Vitesse, 750 Chevaux Vapeur. Etude par Ala Béthy, Ingénieur.—Paris, Librairie Polytechnique, Baudry et Cie, Éditeurs, 15 Rue des Saints Pères, 1889, 8vo., pp. 30, 5 plates. Price 5 francs.

This pamphlet describes and illustrates, in considerable detail, a high-speed locomotive designed by the author. Mr. Béthy considers that it is possible to double the average speed—assumed at 46.5 miles per hour—and thus obtain a speed of 93 miles an hour. The locomotive which he describes has 4 driving wheels, each 9.8 ft. in diameter, and a 4-wheeled swing truck at the front of the locomotive, and a 6-wheeled swing truck at the rear, the diameter of each truck wheel being 4.3 ft. The driving wheels are coupled together, the driving axles being bent to form coupling cranks. There are four steam cylinders, and the four crank pins are 90 degrees apart, the crank pins on each side being 180 degrees apart, so that it is only necessary to counterbalance the coupling rods and coupling cranks. The whole locomotive is encased in a thin iron box, sharpened at the front to decrease the air resistance. The diameter of each steam cylinder is 15.6 in., with a stroke of 19.5 in.

The boiler has the ordinary locomotive fire box, but the shell is divided into two cylinders, one above the other, this arrangement being adopted so as to place the shell between the driving wheels, and thus lower the centre of gravity as much as possible. Each cylindrical shell has a diameter of 33 ft., and contains 149 tubes, each with an internal diameter of 1.6 in. and 16.6 ft. long. The grate surface is 43.8 sq. ft., and the total heating surface 2248.6 sq. ft., of which the fire box contains 207.4 sq. ft. The dimensions of the locomotive over all are: Length, 75.1 ft.; width, 10.2 ft.; height, 14.8 ft. The boiler is proportioned for a working pressure of 160 lbs. per sq. in. The designer estimates that each square foot of heating surface will evaporate 8.15 lbs. of water per hour, so that the boiler will generate 18,000 lbs. of steam hourly. The water tank has a capacity for 22,000 lbs. of water, and the coal-box is designed for 8,800 lbs. The tractive force of the locomotive is computed to be 8,400 lbs., capable of drawing a train weighing 331,000 lbs. The total weight of the locomotive, with coal and water, is 205,000 lbs., distributed so that the greatest pressure upon any journal is about 11,500 lbs. The weight upon the driving wheels is constant, changes in the weights of coal and water affecting only the pressure upon the journals of the truck axles.

The valves of the engines are operated by link motion, one link for the two engines on each side. All the connections are external, except the coupling rods. The centre of gravity of this locomotive is 58.5 in. above the level of the rails.

Standard Specifications for Railroad Structures. By C. F. Bond. The Railroad Gazette, New York. Five forms. Price, 50 cents each.

These forms are: No. 1, Brick and Stone Passenger Stations; No. 2, Brick Freight Houses; No. 3, Brick Engine Houses; No. 4, Frame Passenger Stations; No. 5, Frame

Freight Houses. They are very careful and complete specifications originally prepared for the New York Central & Hudson River, and afterwards adopted by several other companies. They are intended to cover the entire structure, complete and ready for occupancy. The forms are printed with blank lines for the insertion of such conditions as are needed for special localities.

TRADE CATALOGUES.

Catalogue of the Star Brass Mfg. Co.—This catalogue shows a great variety of furniture and fittings for locomotives, cars, etc. It includes registers, gauges, locomotive and marine clocks, lamps, chandeliers and car trimmings, lubricators and general brass goods.

Galvanized Iron in Construction.—We have received from Messrs. John Birch & Co., Liverpool, a small pamphlet devoted entirely to the subject of galvanized, corrugated and flat sheet iron for roofing and other construction work. The pamphlet contains many illustrations, price-lists, shipping directions, etc. It deals first with galvanized, corrugated and flat iron, showing the usual sizes, different methods of joining the sheets, and giving memoranda as to weight per sheet, areas covered by given weights, etc. Illustrations are given of the various fittings, such as rivets, washers, coach screws and bolts and nuts. Different forms of tools useful in connection with work of this kind are shown, and an interesting feature of the catalogue is the page devoted to illustrations of the various hand tools and the method of using them.

Train Accidents in June.

COLLISIONS.

REAR.

3d, on Central of Georgia, at Guyton, Ga., passenger train ran over a misplaced switch and into some freight cars standing on a siding. Locomotive, express and several box cars damaged. Three trainmen injured.

3d, on Pennsylvania, at White Hill, N. J., freight train ran into the rear end of a construction train, wrecking several cars.

6th, on Union Pacific, at Clarks, Neb., passenger train ran into some box cars which a gale had blown out of a spur so as to obstruct the main track. Engineer injured.

10th, on Cumberland Valley road, at Kerrsville, Pa., an extra freight train ran into the rear of a preceding freight, damaging engine, caboose and 3 cars. Fireman injured by jumping.

18th, on Northern Central, near Dauphin, Pa., freight train ran into the rear of a preceding freight, doing considerable damage. One trainman injured.

20th, on New York, Lake Erie & Western, near Susquehanna, Pa., a freight train with a pusher attached was run into by an empty engine. Two locomotives and several cars damaged.

21st, night, on New York, Lake Erie & Western, at Newburg, N. Y., a train of 32 loaded coal cars from which the engine had been detached, was being let down a grade into the yard with the intention of running the whole train into an empty track, but the switch was not turned, and the cars followed the forward part of the train at uncontrollable speed and collided with it, wrecking a large number of the cars, together with others on an adjoining track.

22d, on Union Elevated, in Brooklyn, N. Y., a passenger train ran into the rear of a preceding passenger train, doing slight damage.

22d, on St. Louis, Iron Mountain & Southern, at Harrisburg, Ark., owing to a mistake in signaling, a through freight train ran into a switching freight, doing some damage.

23d, on Alabama Great Southern, near Dudley, Ala., a freight train broke in two on a grade, and the rear portion ran into the forward one, wrecking 2 cars.

25th, on Maine Central, at Portland, Me., a passenger train entering the yard ran into a locomotive switching on the main track, damaging both engines. One trainman injured.

26th, 2 A. M., on Pennsylvania, near Latrobe, Pa., a heavy westbound freight train ran into a switching freight, which claims to have had a proper signal out and that the approaching train was running at high speed. There was a dense fog, and the collision occurred on a high bridge. The river (the Loyalhanna) was about 50 ft. below and about 30 cars were precipitated into the ravine. The two rear cars of a freight passing on the adjoining main track were also knocked off the bridge. Three trainmen were killed and 3 injured. There were a number of trespassers in and on the cars, and of these 9 were said to have been killed and 3 injured. A portion of the wreck was burned up and the number of persons killed seems not to have been definitely ascertained.

27th, on Philadelphia & Reading, in Philadelphia, Pa., a string of cars loaded with pig iron broke loose and ran some distance and into a locomotive standing at a water tank, wrecking it and 11 cars.

28th, on Pennsylvania, near Fittler's, Pa., an empty engine which had been brought to a sudden stop by a preceding freight train was run into by a closely following coal train and pushed into the caboose in front of it, which, together with several cars and the engine, was damaged. The coal train could not be flagged in time to stop.

29th, on Vicksburg & Meridian, near Hickory Station, Miss., passenger train ran into the rear end of a disabled freight train, wrecking several cars.

BUTTING.

7th, on Colorado Midland, near Rusk, Col., butting collision between two freight trains. One trainman injured by jumping.

7th, on Louisville & Nashville, near Pulaski, Tenn., butting collision between two freight trains, wrecking the engines and several cars.

7th, on Louisville & Nashville, near Perdido, Ala., butting collision between a freight train and a work train.

7th, on Central of Georgia, at Macon, Ga., collision on a trestle between a work train running backwards and a switching freight train, doing some damage. A flat car was tipped off the trestle and lodged on a house below, demolishing it completely.

10th, on New York & New England, near Glenham, N. Y., butting collision between two freight trains.

11th, on Pittsburgh, Cincinnati & St. Louis, near New Cumberland, W. Va., butting collision between a passenger train and a work train. Both engines killed.

12th, on Baltimore & Ohio, near Havre de Grace, Md., a butting collision between two freights wrecked the engines and 3 cars. One trainman killed.

16th, on Philadelphia & Reading, in Philadelphia, Pa., butting collision between two freight trains.

19th, on Union Pacific, near Borie, Wyo., a light engine in

descending a grade broke a brake-beam, blew out one of the cylinder heads and ran uncontrolled into the head of a passenger train drawn by two locomotives. Three engines wrecked. Two trainmen injured by jumping.

26th, on Louisville & Nashville, at Birmingham, Ala., butting collision between two engines, due to a misplaced switch, damaging both.

30th, in Philadelphia, Pa., butting collision between a Baltimore & Ohio freight train and a Philadelphia & Reading empty engine, due to mistake in signaling. Both engines damaged.

CROSSING AND MISCELLANEOUS.

1st, on New York & New England, in Hartford, Ct., a westbound freight train ran into the side of a freight train at a cross-over track, wrecking engine and 8 cars. Fireman killed.

3d, on Maine Central, in Portland, Me., a yard engine ran into the side of a switching freight train at a cross-over track, doing some damage.

6th, in Louisville, Ky., a Louisville & Nashville passenger train ran into a Jeffersonville, Madison & Indianapolis freight train. Engine and several cars damaged.

11th, on Baltimore & Ohio, near Cumberland, Md., a passenger train ran into a switching freight train backing on to a siding, doing considerable damage.

12th, on Louisville & Nashville, in the yard at Birmingham, Ala., a freight train ran over a misplaced switch and into the side of another freight train moving in the opposite direction, wrecking engine and 4 cars.

20th, on Northern Central, at Dauphin, Pa., a freight train ran into the side of another freight at a cross-over track, doing considerable damage.

24th, in Birmingham, Ala., collision between a Kansas City, Memphis & Birmingham passenger train and a Louisville & Nashville empty engine. Rear car of passenger train damaged.

DERAILMENTS.

DEFECTS OF ROAD.

1st, on Missouri Pacific, near Jefferson City, Mo., 6 cars of a freight train thrown from the track by spreading of the rails.

6th, night, on Alabama Great Southern, near Carthage, Ala., a burning bridge gave way under a passenger train, the engine, mail, baggage and express cars going down into the creek below. The bridge and the wrecked portion of the train were entirely burned up. The trainmen escaped by jumping.

16th, on Buffalo, Rochester & Pittsburgh, near Springfield, N. Y., engine and three cars of a freight train went through a bridge which had been weakened by freshet.

28th, on Ohio & Northwestern, near Batavia, O., a trestle which had been impaired by a freshet gave way under passenger train, consisting of engine, baggage and smoking car, a coach and an officer's car, all but the engine and baggage car going down into about 15 ft. of water. Two officers badly injured, 2 trainmen and 11 passengers more or less severely injured.

29th, 4 p. m., on New York, New Haven & Hartford, 3 miles north of New Haven, Conn., the baggage car of a southbound express train running at full speed was derailed and thrown crosswise of the track. The wreck of this car derailed all the other cars, except the last, and 3 passengers were killed and 2 passengers and 3 trainmen injured. A frog which had been put in a few hours before was not properly fastened.

30th, on Texas & Pacific, near Terrell, Tex., passenger train broke through a bridge, wrecking engine and several cars. One trainman killed.

DEFECTS OF EQUIPMENT.

10th, on Lehigh Valley, near Sugar Notch, Pa., the tender of the locomotive of a passenger train was derailed by the breaking of an axle; the following coach crashed into the tender and was thrown over on its side and badly damaged. One passenger severely and 8 others slightly injured.

20th, on Baltimore & Ohio, near Baltimore, Md., several cars of a freight train derailed by a broken flange. Brakeman injured.

NEGLIGENCE IN OPERATING.

1st, on Georgia, Southern & Florida, near Valdosta, Ga., excursion train derailed at a Y by a switch which had been left partly turned. The locomotive was overturned, injuring engineer and fireman.

16th, on Baltimore & Ohio, at Locust Point, Md., some freight cars being pushed on to a transfer boat by an engine were stopped when only partially aboard, and the boat slipped from under the train, allowing the latter to fall. The coupling between the engine and cars was broken and the engine also went overboard, and sank out of sight. The engineer went down with his engine, but was rescued. One other employé injured.

18th, on New York, New Haven & Hartford, at Bridgeport, Ct., in making a flying switch 2 box cars were run off the end of a spur track and crashed into an adjacent building. A brakeman was killed.

27th, on Boston & Maine, at Dover, N. H., passenger train derailed by a misplaced switch, the engine and 3 cars being ditched. Five passengers injured.

28th, on Natchez, Jackson & Columbus, at Raymond, Miss., excursion train derailed by a misplaced switch. The engine was overturned and damaged, and the engineer and fireman were injured.

29th, on Chicago & Grand Trunk, at Emmett, Mich., passenger train running at high speed derailed and ditched by a misplaced switch, injuring 5 passengers.

UNFORESEEN OBSTRUCTIONS.

9th, on Louisville & Nashville, near Falkville, Ala., engine and several cars of a freight train were derailed by ties which had been maliciously placed upon the track at a curve.

10th, on Maine Central, near Oakland, Me., engine and 2 cars of a passenger train went down into a creek, the bridge over which had been washed out by a freshet. Five trainmen badly injured.

12th, on Wilmington & Northern, at Chaddis Ford, Pa., a freight train ran over some cattle, derailling engine and 3 cars.

14th, on Ohio River road, near West Columbia, W. Va., a freight train ran over a cow, derailling and damaging 9 cars.

18th, on Tennessee Coal, Iron & Railroad Co.'s line, near Pratt Mines, Ala., a mixed train running backwards at about 10 miles an hour on a short branch from the main track to a coal mine was derailed by a cow. The foremost car, which contained about 80 men, going to work at the coal mines, was overturned and 2 of the men were killed. There was no bell cord connected with the engine, and the trainmen testified that the crowd of passengers on the platform of the car hindered them from giving hand motions as promptly as they otherwise would.

24th, on St. Louis, Arkansas & Texas, near Dallas, Tex., a freight train ran over a cow and the engine and 6 cars were derailed and wrecked. Four trainmen and 1 passenger injured.

25th, on St. Louis, Arkansas & Texas, near Pine Bluff, Ark., a passenger train approaching a trestle ran over a cow

and was derailed, 5 cars, including 2 coaches and a sleeper, going into the ditch in a wreck. One passenger killed, 2 trainmen and several passengers injured.

27th, on Mobile & Ohio, near Cairo, Ill., passenger train ran over a cow and several cars were derailed and upset in the ditch, damaging 7 cars.

UNEXPLAINED.

21, on Georgia Central, at Elea, Ga., engine and 1 car of passenger train derailed.

3d, on the St. Louis, Arkansas & Texas, near Gilmer, Tex., passenger train derailed. One trainman injured.

3d, on Central of Georgia, near Eufaula, Ala., passenger train derailed. Two coaches and a sleeping car were thrown over on their sides. One passenger injured.

4th, on Philadelphia & Reading, at Sellersville, Pa., a car of a freight train was derailed and thrown in front of another freight train passing on the opposite track, making a very bad wreck. Engineer injured. A tramp stealing a ride was killed and another badly hurt.

7th, on Northeast-rn, near Charleston, S. C., freight train derailed and wrecked. The engineer and 1 other trainman and a tramp stealing a ride—killed and fireman injured.

8th, on Union Pacific, at Greeley, Col., engine and 4 cars of a passenger train derailed, the former being overturned and badly damaged. Engineer injured.

8th, on Atchison, Topeka & Santa Fe, near Sedalia, Col., passenger train derailed.

10th, on St. Louis, Iron Mountain & Southern, in Poplar street, St. Louis, Mo., a passenger train was derailed. The engine tipped over, damaging an adjoining building. Engineer and a man riding on the pilot were killed and the fireman and 2 other employees injured.

11th, on Atchison, Topeka & Santa Fe, near Strong City, Kan., engine and several freight cars of an accommodation train were derailed and wrecked. The locomotive was overturned, killing the fireman and injuring the engineer.

12th, on Philadelphia, Wilmington & Baltimore, at Fairview Park, Del., freight train derailed and a number of cars wrecked.

12th, on Boston & Albany, at Springfield, Mass., car of a freight train derailed.

14th, on Missouri, Kansas & Texas, near South Mound, Kan., freight train derailed and 7 cars wrecked.

16th, on Pennsylvania, near Duncannon, Pa., engine and 11 cars of a freight train derailed and wrecked.

18th, on Louisville & Nashville, at Florence, Ala., as a passenger train was approaching the station the rear trucks of the last car were derailed and stripped from under the car, which was dragged along the track some distance and badly damaged.

19th, on Pittsburgh, Cincinnati & St. Louis, at New Cumberland Junction, W. Va., fast mail train derailed and 3 cars thrown over an embankment. Two postal clerks killed and 4 other trainmen and 4 passengers injured.

21st, on Louisville & Nashville, near Calender, Tenn., a car of a passenger train derailed and damaged.

22d, on Pittsburgh, Cincinnati & St. Louis, in Pittsburgh, Pa., several cars of a freight train derailed.

22d, on Baltimore & Ohio, near Frederick, Md., freight train derailed and partially wrecked.

23d, on Pennsylvania road, near Smock's Station, Pa., a construction train, consisting of engine, 11 cars and a caboose, was derailed and thrown over an embankment in a bad wreck. Engineer killed, fireman fatally scalded.

26th, on Chesapeake & Nashville, at Bledsoe, Tenn., passenger train derailed. Several cars thrown down an embankment and wrecked. Eight passengers injured.

OTHER ACCIDENTS.

12th, on Central Vermont, near Ludlow, Vt., wheel under a car of a freight train broke.

24th, on Southern Pacific, near San Lorenzo, Cal., driving axle of engine of local passenger train broke.

27th, on Pennsylvania, near Frackville, Pa., engine of a passenger train blew out a cylinder head.

29th, on Northern Pacific, near Eldridge, Dak., a dining car in a passenger train caught fire and was destroyed.

A summary will be found in another column.

The Boston & Maine Freight Office at Worcester, Mass.

Mr. F. L. Hutchins, Local Freight Agent of the Boston & Maine at Worcester, Mass., sends to the *Station Agent* an account of the methods pursued in doing some of the detail work in his office, from which we print extracts below. The article is accompanied by a diagram of the yard showing the connections with other roads and numerous private sidings. Worcester is the Southern terminus of the Worcester & Nashua, now controlled by the Boston & Maine, and the business of the station, as will be seen by some of the figures, is only moderate for so large a city. Most of the grain, most or all of the coal and much of the lumber consumed in the city comes over other roads.

Mr. Hutchins begins by describing the tracks and their uses. Cars from connecting roads are taken by B. & M. engines from the connection tracks. All cars from the southern connections are taken by a switching engine to a point on our main track above our upper yard, and from this shifted as follows:

All cars for straightening which have to come to our house go on to track O. All cars for Nashua go on to track 1. All cars for Lowell on to track 2. All cars for local stations on the road between Worcester and Nashua go on to track 3. All cars for the Old Colony railroad, via Sterling Junction go on to track 4. Cars for Rochester (N. H.) and points beyond are shifted to track 5, and bulk freight that comes from other roads to be delivered to parties upon our yard tracks go to track 6 until we can take them to their respective side tracks.

Our yard force comprises a yard master, a yard clerk, car marker, car recorder, car sealer, four conductors of switching engines with three men each, four switchmen and two extra men. We use one engine in the middle (freight-house) yard, one to haul trains back and forth from the connections and our upper yard, and one engine to take care of the lower yard where are located the shops, delivery tracks for bulk cars, and connections with the Boston & Albany, Providence & Worcester and New York & New England; one other engine puts away bulk cars and digs same out when called for by consignees, and assists in hauling trains from other roads.

Our yard clerk makes a list of every train coming into the yard on blanks put into blocks, showing initial and number of the car, seal records, north and south, and remarks. The recorder does the same for all trains coming from the other roads, the numbers and seals being taken immediately upon delivery. These men also take the lists of all cars out-going, the yard clerk of cars going out on the road, the recorder of cars going to all other roads. These lists make our car records, being returned to the office as soon as taken, and filed on regular Shannon files, and indexed in a book, which is in terlined and kept especially for that purpose. We have six-

teen books bound. Each book is indexed on every second page at right hand for fifty numbers and each page containing fifty lines—also numbered—which gives us record room for 5,000 cars for each book. We have a book for each of the following-named cars: Boston & Maine, Boston & Lowell, Providence & Worcester, New York & New England, Northern & Western, Boston & Albany, Passumpsic and Maine Central, in which we do not use initials of cars on records. The other books are for miscellaneous cars from 1 to 6,000, in which we enter the initial as well as record. If seal record or the point loaded for is desired, we go to our lists and by this record find the original entry which gives us all we wish to know. At the close of each month these lists, kept on four separate files, according as they are inward or outward or from or to other roads, are bound with heavy flat binding wire, nicely covered with heavy manilla paper, lettered on the back and filed away. This part of our records we are quite well pleased with and proud of, as we can in a moment locate any car that has been in our yard since the system commenced, and not only that but show seal record, and if anything peculiar in regard to it, such as leaking, door gone, etc., that is shown under head of remarks, upon the same slip.

All way-bills brought in by trains running in the night are brought by the conductor to the office, and, in the morning, lists of each train are made by a clerk from the way bills, on a form known as the switching list, which shows initial, number, disposition and check of each car. The car marker, from these lists, marks the cars, and the trains are switched from these marks. The slips are checked, showing the arrival of cars, and any cars, received without account, are added to the same as "no bill" by the marker. In case of trains arriving during the day, when time is short in which to handle them, the conductor draws off a list of his train from the way bills, and the train is marked by that list, but the regular list is made in the office from the bills as soon as brought in, and the car marker checks up this list from the conductor's slip as soon as the train is marked, thus providing against any errors in the conductor's work.

The freight to and from other roads is transferred on through bills, or vouchers, sent from one to the other by messengers. These bills come to us from the New York & New England at 8 a. m. and 1 and 5 p. m., from the Providence & Worcester and Boston & Albany at 10 a. m. and 4 p. m. Slips corresponding to those used for inward trains are made for all these trains, bearing the time of receipt of bills at the top of the list, and are checked by the car marker as he marks the trains according to these lists, and they are then returned to the office, when all those cars which have not come, and those which have come without account, are drawn off at the top of the slip to be used for the next delivery, thus keeping cars without account, and cars that are short, before our eyes all the time. These switching lists are kept on Shannon files, and at the end of each two months are bound, lettered and filed away the same as the car lists, handy for immediate reference at any and all times.

Duplicate way bills are made of all through way bills, going in either direction, and each duplicate is copied into one of twelve different tissue books, arranged according to the business, and via the different roads. The duplicates are then sent to our auditor for his use in making up accounts. The bills for all full carloads that run to other roads, without being opened here, are sent by messenger to the respective roads, previous to the delivery of the train. All bills for full carloads from other roads that are not opened here are sent under cover to our junction points ahead of cars, a running slip for conductors' use being made for each bill, and given to our yard clerk, who allows no car to leave the yard without such running slip.

The way bills of all cars that come to our house to be handled go to a clerk to be drawn off on a sheet, showing consignee and destination, route, goods, checking and initial and number of car transferred to. These sheets go to the checkman in the house for his use in checking the car. I would prefer a blind check, but on account of the many different routes to the same point for much of our business it is impracticable here, as the checkman must have the route given him in order to properly handle the freight. These sheets, when the car is checked, are returned to the office, where they are checked up with the bills, and all overs, shorts or damage noted on same are reported upon a regular report, bearing a number, which number is noted upon the sheet showing that the report has been made. These sheets are kept upon wires similar to the Shannon file, and at the close of the month are provided with covers and bound similar to our track and car lists, and are then filed away handy for ready reference at any time. These sheets give us a perfect record of all that is in the cars we handle, and in such form that we retain all the needed information regarding the same, in a permanent form, readily accessible at all times.

All Worcester bills are vouchered by one clerk, who notes voucher, number and reference (commencing with No. 1 on the first of each month's business), on the voucher and on the bill. These bills are then taken by another clerk, audited, and the amounts of each voucher item drawn off on a sheet showing the progressive number, freight charges, advance charges, total charges, check and when paid. These sheets, with the vouchers are handed to the cashier. The bills are then put upon the received book by another clerk, who proves the addition; the cashier checks the vouchers and schedule, thus making three good and different checks on the correctness of the voucher. The total of each day's schedule and the total of the received book are compared daily, making still another check. These different checks provided against errors in either our vouchers, or our debits to the cashier. All changes occasioned by erasures or by corrections, are changed by means of corrected vouchers, rendered the cashier. This part of our work is particularly under the charge of our chief clerk. The totals of the received book, and of the schedules, for the month, being the same, prove our freight report, when the same is made at the end of the month.

All vouchers which come from the other roads, after the same are drawn off upon our check list, go to the cashier, who enters them up as credit into books kept for each road, and the same are charged against the billing clerk upon a blank showing the advanced and prepaid charges. All items that are prepaid are likewise entered upon this sheet, either from the cash book, as the money is taken in, or from vouchers rendered by the billing clerk, on such shipments as are made by firms enjoying weekly credits. The billing clerk, the first thing in the morning, takes a similar sheet and his tissue books, and carefully draws off all prepaid and expense items, noting name and station, and these two lists are checked against each other, being a check upon the cashier and upon the billing clerk both, as any items omitted by the billing clerk are quickly shown, as well as any errors on the cashier's part. These are totaled and the footings compared, and at the end of the month the total footing proves our forward report so far as the expense and prepaid portions of the same are concerned. The totals of these two schedules, and also schedule made of all the items and miscellaneous charges, such as switching, storage, etc., comprise the debit and credit of the cashier, and he has nothing to do with the accounts of the station, except to see that his remittances and

vouchers on hand cover all charges shown by these schedules rendered him. By this method we are able to keep the accounts of the station to a cent, and to ascertain its standing on any day or hour of the month with very little labor.

As a further check upon the cashier we take his schedule at the last night of each month and draw off all items which are not checked as paid, showing voucher number against each item, the cashier at the same time making a list of all vouchers on hand unpaid, which two statements are checked, one against the other, any differences investigated and straightened, resulting in the two different statements showing the same amount of outstanding accounts in favor of the station, which makes our uncollected list as rendered the auditor.

A complete list of cars in the yard is taken each morning, each track being named, and the direction in which cars set is shown upon the sheet. The party who takes these lists does not fill out the date, that being drawn off the preceding day's list in the office and carried over from day to day until the car finally disappears from the yard, by going either to other roads or out on our road. This keeps us well posted on the length of time cars stand upon the tracks, and enables us to weed out the old ones. All movements of cars in the yard are directed from the office upon car order slips which are numbered consecutively, and put up in sub books, and the stubs being checked up, keeps us informed as to yard work, and also makes a valuable record that we can go back to, and locate the movement, or disposition, of any car, at any time, since the system commenced.

We have here a very large number of cars which are billed in to the shippers, and then orders given for their disposition. These orders we keep filed on Tapley files, first entering them up in a book ruled for the purpose. The numbers are entered in columns by right hand figure, thus saving time in looking up. This also gives us an easily accessible record of all orders, and we are continually finding it of very great value. All bulk cars arriving at Worcester for Worcester delivery are also entered on a book ruled in the same manner, to afford facility in looking up of cars. Our cars being unloaded at very many different points from the station, and having no yardman upon whom we can put the duty of looking out for the unloading of cars, we have to trust entirely to consignees, and they annoy us considerably by not signing the delivery check when cars are unloaded, and when they do so, oftentimes they are very slow in returning them to us. We file away our delivery checks in consecutive order at the end of each two months, making a thorough examination to see that we have received them all, and those that we find missing we make duplicates of and make special efforts to have them signed. This is very unsatisfactory to us, but as yet I have found no adequate remedy.

TECHNICAL.

Car Notes.

The Minnesota Car Co.'s buildings at Duluth, Minn., are completed, and the machinery for the different departments, rolling mills, steam wheel, forge foundry and erecting shops is now being put in, and in a very short time the works will commence the manufacture of cars, being able to complete 15 a day. The two large batteries of boilers are in position.

The St. Louis Car Co. is working on the following orders for street cars: Twenty for the Broadway line and 10 for the Union line, in St. Louis; 15 for St. Joseph and 15 for Peoria. The company will soon make additions to the machinery in use in the blacksmith shop, and will also soon erect another building.

The Laclede Car Manufacturing Co., of St. Louis, has contracted to build the following street cars: Forty coaches and 40 grip cars for the Denver City Cable line; 20 grip cars and 10 open coaches for the Kansas City Co.; 20 closed coaches for the St. Paul Cable Railway Co.; 12 motor coaches for the Redonda Railway Co., Los Angeles, Cal.

Bridge Notes.

The Smith Bridge Co., of Toledo, O., was awarded the contract for building the bridge at Chattanooga, Tenn., referred to last week. Neely, Smith & Co., of Chattanooga, were awarded the contract for the substructures. The contract for the superstructure was let at \$122,361 and for the substructure at \$96,198. The bridge will be 2,370 ft. long, three spans of 210 ft. each and three spans of 320 ft. each, and 780 ft. of trestle on the northern approach. It will be 100 ft. above low-water mark, obviating the necessity for a draw. The substructure is to be completed by July 1, 1890, and the superstructure by Sept. 1, 1890.

Peter C. Hains, Lieut.-Col. of Engineers, Washington, D. C., will receive proposals until July 25 for the construction of an iron pile bridge over Mill Creek at Fort Monroe, Va.

The following bids for the erection, etc., of a substructure and superstructure of a viaduct or bridge over certain tracks or lands in Kansas City, Mo., were received: Detroit Bridge & Iron Works, Detroit, Mich., bid complete, \$77,250; King Iron Bridge & Mfg. Co., \$71,000; George E. King Bridge Co., \$73,600; P. E. Lane, \$80,000; Mo. Valley Bridge & Iron Works, Kansas City, Mo., \$69,733; Kansas City Bridge & Iron Co., Kansas City, Mo., \$69,450; Wrought Iron Bridge Co., \$70,000; Mt. Vernon Bridge Co., \$79,800; Horace A. Keefer, \$78,400.

The Missouri, Kansas & Texas will soon let the contract for rebuilding the bridge over the Trinity River, near Fort Worth, Tex., which was destroyed by the recent flood.

The Selectmen of Brunswick, Me., have awarded the contract for building an iron span to the Androscoggin bridge, on the Brunswick side, to the King Iron Bridge Co., of Cleveland, Ohio. The present wooden approach will be repaired by an iron truss 90 ft. long.

The City Engineer of New Haven, Conn., has just completed plans for a steel arch bridge, to cost \$11,000, to be erected in East Park.

It is proposed to build an iron bridge 145 ft. long at Lancaster, Tex.

Bids for the bridge across the San Joaquin River at Lane's Ford, Cal., were as follows: San Francisco Contracting Co., \$44,885; California Bridge Co., \$25,900, \$29,900 and \$38,900; King Iron Bridge Co., \$38,910; American Bridge Co., \$33,750; B. McMahon & Son, \$28,750.

A viaduct will probably be built over the railroad tracks on Bridge street, Jacksonville, Fla., by the city authorities.

The Chicago, Rock Island & Pacific is building a new iron bridge, 791 ft. long, across the Cedar River, at Moscow, Ia.

The Board of Supervisors of Santa Barbara County, Cal., will receive plans and bids until Aug. 12 for building a bridge of one span, 180 ft. long, across the Santa Ynez River at Dyer's Crossing, near Lompoc.

Manufacturing and Business.

Harris & Co., of 188 Wabash avenue, Chicago, proprietors of the Harris track-laying machine, have just fitted up one of the machines for the Oregon Railway & Navigation Co. The firm has recently received orders for these machines from the Burlington & Missouri River road

the Northern Pacific, the Alabama Midland and the Denver, Utah & Pacific.

The Thomson Electric Welding Co. will at once erect another factory at West Lynn, Mass.

The Ross-Meehan Car Brake Shoe Co., at Chattanooga, Tenn., has just completed a new addition to its works at that place and increased its force of workmen. About 100 men are now employed.

The Northern Pacific has recently placed orders with the Dunham Mfg. Co., of Boston, for Servis railroad tie plates and for 1,500 sets of Dunham storm-proof freight car door. The Missouri Pacific has also ordered 500 sets of doors, and a number of smaller orders have been received from various roads.

The Abendroth & Root Mfg. Co. of New York, manufacturers of spiral riveted pipe, has established an office at 62 South Canal street, Chicago, in charge of Smith & Knapp, for the sale of its pipe, couplings, joints, etc.

Over 3,000,000 ft. of lumber have been bought in Cadillac, Mich., for the immense new plant of the Westinghouse Air Brake Co., at Wilmerding, near Pittsburgh.

The property known as the Hinckley Locomotive Works, in Boston, which includes several large shops, has been purchased by the West End Street Railway Co., with the object of establishing an extensive electric plant to furnish power for running its electric cars.

Anderson Bros., of Philadelphia, shipped last week a 40-in. three-ply and a 36-in. three-ply leather belt to the Cambria Iron Co., Johnstown, Pa., to replace those destroyed by the flood. Previous to this they sent the same company a 40-in. leather belt, which was lost on the cars during the flood. The firm has also just shipped a very large leather belt, 51 in. wide, three-ply, 170 ft. long, and weighing 2,414 lbs., to Manayunk, Pa.

The Laidlaw & Dunn Co., of Cincinnati, O., has sold two of its 1,000,000 gal. "Standard Duplex" steam pumps to the Georgetown (Ky.) Water-works. The company is now filling orders for six of this capacity.

Iron and Steel.

The McKeesport Foundry & Machine Co., Limited, of McKeesport, Pa., with a capital of \$25,000, has applied for a charter. The company has just concluded the purchase of the Penny Foundry & Machine Works of that place, and will remodel and greatly increase the capacity of the plant. Jacob Taylor is General Manager of the firm.

The Hazelton Boiler Co., New York, have just received an order from the Phoenix Iron Co., Phoenixville, Pa., for two of their 250 h. p. boilers. This makes the sixth order that they have received from the same firm, and when these two new boilers are in position they will make a total of 1,475 h. p. of the Hazelton boilers in operation at the Phoenix works.

C. Y. Wheeler & Co., of Pittsburgh, who have operated the Sterling Steel Works, at Denmler, Pa., for five years, under lease from Charles Jones, the owner of the plant, have purchased the same for \$28,000, and will enlarge and remodel it. The company recently increased their capital stock to \$150,000.

The Tonawanda Iron & Steel Co. will put the blast furnace at Tonawanda, near Buffalo, N. Y., in blast about Aug. 1. Under the new management Lake Superior and Lake Champlain ores will be used, with coke as fuel. The new company expect it to turn out 100 tons of pig-iron daily. The President is William A. Rogers; General Manager, F. B. Baird. This furnace was built in 1873, but was in blast only a short time. It is 16 x 61 ft. in size, supplied with Ford stoves.

The Springfield Iron Co., of Springfield, Ill., has just put in operation a new 12-in. guide mill for the manufacture of the smaller sizes of merchant iron. The mill, which is a duplication of the one heretofore in operation, will turn out about 800 tons of merchant iron a month, and give employment to about 100 additional men.

The Muskegon Iron Works Co. has organized at Muskegon, Mich., with the following officers: Daniel Kerr, President; Joseph Latch, Vice-President; Wm. Schergan, Treasurer; Charles Kerr, Secretary. The company will erect a foundry and machine-shop and engage in the general jobbing trade.

The strike at the Homestead Steel Works, near Pittsburgh, is ended, and work will be resumed as soon as the furnaces are heated. A conference between the Amalgamated officials and the members of the firm resulted in an amicable settlement July 14. The terms of the settlement are not known, but it is understood that concessions were made on both sides. The workmen, it is said, have agreed to accept a 20 per cent. reduction instead of 35 per cent., as proposed by the firm. The scale will remain in force for three years, ending in 1892, and instead of the scale year beginning with January, as proposed by Mr. Carnegie, it will commence upon July 1, the same as the Amalgamated iron scale.

Engineers are now preparing and perfecting plans for the two blast furnaces of the Monongahela Furnace Co., of McKeesport, Pa. When ready these will be forwarded to contractors for bids upon the work to be done. W. B. Shiller, late of Youngstown, Ohio, is Business Manager of the company. W. Glyde Wilkins, civil engineer, has charge of subconstruction, grading and excavating, and all foundation work, together with the laying out of the railroad system, preparing plans and supervising the work. Frank C. Roberts, civil engineer, of Philadelphia, takes charge of the superstructure of the furnaces and their equipment.

The Swindell & Smythe Co., Pittsburgh, are building gas-furnace plants for the Paige Tube Works, Warren, O., and the Etna Iron & Steel Co., of Bridgeport, O., and three melting furnaces and a large enameling furnace for the Standard Manufacturing Co., of Allegheny City, Pa.

The plant of the Etna Iron & Steel Co., of Bridgeport, O., has been closed down for the annual repairs, and also for extensive improvements, which will require from four to six weeks' time to complete.

The Bellefonte Furnace, Boyd County, Ky., of the Means & Russell Iron Co., has again been put in blast after the addition of a new hot blast stove, and will continue to manufacture warm blast charcoal pig-iron, with a daily output of 15 tons.

E. C. Converse, J. H. Flagler, Joseph R. Jackson and others have organized the Republic Iron Works, Limited, of Pittsburgh, Pa., with a capital stock of \$600,000.

The Standard Iron Co., of Bridgeport, Ohio, is erecting a brick building 50 x 140 ft. and three stories high which will be used exclusively for the company's corrugating business.

The first mortgage bondholders of the Etna Iron Works, Ironton, O., propose to foreclose the mortgage and sell the property to a new corporation, which will operate the concern and make needed improvements. The new corporation will have \$1,000,000 first preferred stock, 6 per cent., cumulative; \$250,000 second preferred stock, 6 per cent., cumulative, and \$400,000 common stock.

The Cape Cod Canal.

The big dredger of the Cape Cod Ship Canal which has been undergoing repairs will soon resume operations. The capacity

of the machine is about doubled. The canal as at present excavated measures 5,715 ft. inland from Cape Cod Bay, is 200 ft. wide and 16 ft. deep. The end of the cut is now 892 ft. from the boundary line of Bourne and Sandwich, and the canal runs nearly parallel with the Old Colony Railroad tracks.

The Otis Iron & Steel Co.

This Cleveland company has sold out to an English syndicate for \$4,500,000. It is said that the works will be carried on for the present by the old management. The securities of the new company consist of \$1,500,000 6 per cent. debenture bonds, \$1,500,000 8 per cent. preferred stock and \$1,500,000 common stock. One thousand men have been employed recently by the works, which produce iron and steel plates for locomotives, ship building and general construction work.

Wreck of Part of the Verrugas Viaduct.

An account is given in the *Engineering and Building Record* of July 13 of the destruction of two spans of the Verrugas Viaduct, illustrated by engravings from photographs of the bridge before and after the wreck. The description and photographs are from Mr. J. B. Molloy, of Lima, Peru. It appears that the present season has been unusually rainy in the mountains along the line of the Oroya railroad. The wreck was caused by a heavy storm, which took place March 23. About 5 o'clock of that afternoon a mass of earth, stone, trees and water, estimated at 8,000 tons, swept down the ravine and carried away the middle pier, which caused the fall of the two adjoining spans. The wreck of the centre pier and the spans was carried down the ravine about a quarter of a mile. One line of rails still hangs across the opening, about 200 ft. The masonry at the foot of the piers is said not to have been injured. The total length of this viaduct is 575 ft., and the height of the central pier 252 ft. It was designed and built by the Baltimore Bridge Co., and was erected in 1872 by L. L. Buck. It consisted of four Fink truss spans, supported by two stone abutments and three iron piers. The central pier stood in the centre of the waterway of the ravine. A stone wall was built around the iron work to turn the water from the tower and to prevent earth and stone from falling into the pit in which the pier stood. This wall was not intended to resist the action of a flow of mud and stones, as there was no evidence that such a flow had ever occurred. Had there been any such evidence nothing could have been done to protect a pier placed as this was. It occupied the greater part of the width of the bottom of the ravine, and a wall could only act as a dam to raise the water.

Consolidation of the Westinghouse Electric Interests.

The stockholders of the Westinghouse Electric Company have agreed to reorganize under the name and charter of the Westinghouse Electric and Manufacturing Company. This charter is that of the Charters Improvement Company, granted in 1871, and carries with it power and privileges which have not been contained in more recent charters. It is said that all of the electric companies now controlled by the Westinghouse Company will be consolidated under the new organization. The certificates of the old company are to be exchanged for the new, share for share.

A Locomotive Built and in Service in Twelve Days.

On Saturday, June 22, the Baldwin Locomotive Works received an order from Mr. Robert H. Coleman, of Cornwall, Pa., for a passenger locomotive for the Cornwall & Lebanon Railroad Company's narrow gauge extension to the summit of Mt. Gretna. The locomotive was to be of the American type, with eight-wheeled tender, equipped with Westinghouse air brake, and all the improvements in use on standard gauge passenger locomotives of the highest class. The materials for this locomotive were ordered from the respective manufacturers the same day. The boiler plates were received at the works on Tuesday, June 25, and the complete boiler was taken into the erecting shop on the evening of June 28. The locomotive was tried under steam on Monday, July 1, with the wheels under it. The tank plates arrived on Friday, June 28. The hand rails, wheel covers, bell, number plate and many other details of the finish were nickel-plated. The boiler and smoke box were lagged with asbestos and jacketed with planished iron. The locomotive and tender were finished on the evening of July 2, and shipped on the morning of the 3d. They reached Lebanon the same evening, and were in service on the Fourth of July.

Press for Metal Ties.

A recent issue of *Engineering* describes a hydraulic steam press for making metallic sleepers, which is used in several large establishments on the Continent, and which turns out from 2,000 to 2,250 sleepers per day.

To Build Steel Vessels for the Lakes.

The Illinois Steel Co. has, it is stated, decided to commence building steel vessels for employment in lake commerce. It is understood that shipyards are to be located at South Chicago. At Duluth last week the Minnesota Iron Co. voted to place its \$1,500,000 surplus in the hands of the directors. This company, it is stated, is controlled by the Illinois Steel Co., and the voting of this surplus was to put it at that company's disposal. W. I. Babcock, Superintendent of the Union Dry Dock Co., of Buffalo, has been selected as the head of the mechanical department of the proposed new yards.

THE SCRAP HEAP.

Notes.

A collision on the Paris, Lyon & Mediterranean at Grenoble, July 13, killed or injured 20 persons.

The engines which were in the Johnstown flood, thirty-nine in number, have all been taken out of the mud and are standing on a side track at Johnstown. Some of them are damaged \$500, others \$1,000, and some fully \$3,000.

Judge Cox, in the United States Circuit Court at Utica, N. Y., has issued a writ of mandamus ordering the Delaware, Lackawanna & Western to receive and transport Nelson Morris' "palace" cattle cars from Buffalo to seaboard points.

A certificate was filed in New York this week setting forth that the capital stock of the Brazil Mail Steamship Co., amounting to \$1,000,000, has been paid in. The certificate is signed by H. K. Thurber, President, and the directors, among whom are C. F. Huntington, George G. Williams, Edward B. Bartlett and Charles R. Flint.

The officers and employees of the New York Division of the Pennsylvania Railroad contributed \$5,600 to the relief of the railroad men affected by the flood west of Harrisburg. The sum of \$1,000 raised for the railroad employees and their families by the officers and employees of the Savannah, Florida & Western, and other roads of the Plant system, was sent to General Manager Pugh, of the Pennsylvania, with authority to transfer the money to the relief committee at Johnstown, if not needed by the railroad men.

The Inter-state Commerce Commission will shortly issue two circular letters. One, to be addressed to railroad employees, is a request for information about accident associations that exist in different companies, and for information on the apprentice system, and the manner of promotion. The circular meant for the company's officers is similar. It asks for details of all insurance schemes and their operations, and concerning technical training that may or may not be a feature in the company's shops. This letter also asks concerning eating houses for railroad men when they are away from home.

Rule for Stopping Trains at Junctions in Illinois.

The Railroad and Warehouse Commissioners of Illinois have issued a revised rule, which reads as follows:

"The commission is of the opinion that a point where the trains of two or more railroad companies enter upon a track used jointly by said companies, each having equal right of way, and said point being without the limits of any incorporated city, village, or town, should be regarded as a 'crossing' within the meaning of section 12 of the act in regard to tenuring and operating railroads. Such a junction of tracks is clearly within the reason of the section requiring trains to stop at crossings. We, therefore, rule that all trains should come to a full stop before entering upon such joint track, the same as at railroad crossings proper."

Bulletins of Delayed Trains.

A suit has been begun at Shelbyville, Ind., against the Cleveland, Cincinnati, Chicago & St. Louis road, demanding a forfeiture from the company of \$20,000 for failure to observe a statute enacted by the last Legislature requiring all railroads in the State to put up at all stations where there is a telegraph office, bulletin boards giving the [probable] time of arrival of all trains, the penalty in each instance being a forfeiture of \$25. Six weeks' failure on the part of the company to note the arrival of twenty-one trains daily in this county makes the aggregate demand-d. A similar suit will probably be instituted against the Jeffersonville, Madison & Indianapolis.

Inexpensive Arbitration.

That the principle of arbitration is widely recognized in all grades of the railroad service is increasingly manifest. This wise, sensible and beneficent substitute for wicked and wasteful warfare may yet be the means of stopping as much carnage and bloodshed among clashing passenger agents as among great nations, as can be seen from instances like the following, copied from a Louisville paper. The economy and simplicity of this plan, as compared with extravagant outlays for cigars, carriage hire, etc., is too plain to need mention.

NEW WAY TO GET BUSINESS.

The Louisville, Evansville & St. Louis yesterday secured a handsome party of tourists from the Ohio & Mississippi in a rather novel way. There were 11 passengers in the party, bound for Las Vegas, N. M., and their round trip fares amounted to upwards of \$700. The rival agents began work on them when they arrived from Brandenburg Tuesday, but there was an even division in the party as to the route to be taken. One of their number was a colored cook, who had no voice in the matter, and five wanted the O. & M., while as many declared they would go only by the Air Line. They wanted to go in a body, but it was impossible to adjust the difference, and three trains were allowed to leave without them. At last in the evening at their hotel they concluded to let the roads trust to luck in the matter. Two cards were placed in a hat held by a stranger, while another disinterested person drew out one bearing the name, "Air Line." This settled the case, and the tourists were started out, perfectly satisfied.

Standard Railroad Time in Austria.

At a general conference of Austrian railway managers held recently, Mr. Zudwigh, President of the Hungarian State Railways, introduced a resolution proposing the adoption of a common railway time for Austria and Hungary, based upon the time of the fifteenth meridian east of Greenwich. The time now used is Buda-Pesth time for the eastern lines and Prague time for the western lines. The time proposed is one hour faster than Greenwich time, six hours faster than Eastern time, seven hours faster than Central time, etc. This resolution was adopted almost unanimously, and now only awaits the ratification of the ministry. Standard time is, therefore, likely to be soon in use in Austria, as it is already in this country and in England, Sweden and Japan. Dr. Robert Schram, of Vienna, has advocated the adoption of standard time on the continent of Europe for several years, and the arguments employed before the railway conference were largely taken from a pamphlet published by him in 1886. Professor Pasquier, of the Louvain (Belgium) University, has also published a pamphlet advocating the adoption of Greenwich time for use in Belgium. Dr. Schram has recently issued a second pamphlet, in which he advocates the adoption of names for the several standard times to be used throughout the world, as proposed by the writer at the International Meridian Conference in 1884, but suggests that in place of the names then proposed, with a few exceptions, others shall be chosen. These names he arranges with their initials in alphabetical order, omitting J and W. Thus, for the time about to be adopted in Austria he proposes the name of "Adria Time," for the next eastern section "Bosphorus Time," and for the next "Caucasus Time," etc. He argues in favor of this plan that the initial letter in every case would indicate the precise relation which the time of any section mentioned bears to any other section. We may have something further to say on this subject hereafter—*Official Railway Guide*.

New Shops and Stations.

The Cheyenne Board of Trade laid the corner-stone of the extensive Union Pacific shops in course of construction at Cheyenne, Wyo., on July 10. The plant is of brick and stone and includes a big wheel foundry, and when completed in 1891 will employ 2,000 men.

The Pueblo (Col.) Union station contract has been signed by all the railroads interested. All that remains to be done now is to let the contract and the work of building will be pushed.

Michigan Railroad Laws.

A dispatch to the Chicago *Inter-Ocean* gives the following as a synopsis of laws passed by the Michigan Legislature affecting railroads: "The Chasman-Gilmore bill provides that roads whose gross earnings in 1888 equalled or exceeded \$3,000 per mile shall charge but 2 cents per mile fare; less than that sum or in excess of \$2,000, 2½ cents; less than \$2,000, 3 cents. Upper Peninsula roads may charge 3 cents on gross earnings not exceeding \$3,000, and 4 cents when less, these provisions applying to no road operating less than fifteen miles.

This act also provides for thousand-mile tickets for \$20 in Lower and \$25 in Upper Peninsula, available to the purchaser, his wife and family, and valid for two years. Unused portions will be redeemed at the end of that time, but the roads can charge 3 cents per mile for portion used.

Another law provides, after Nov. 1 of the present year, for heating cars of all passenger or mixed trains by steam

from the engine or some other equally safe appliance in the discretion of the Railroad Commissioner.

Another requires that on and after Oct. 1, 1890, all engines and tenders shall be provided with air-brakes, thus relieving the rest of the train from stopping the engine. Another provides that roads shall carry state troops under orders at a fare of 1 cent per mile.

Disinfection of Cars.

The last circular of the Pennsylvania on this subject requires that passenger cars be thoroughly cleansed and disinfected at least once a week, and all rubbish, so far as possible, burned. Where this cannot be accomplished, a special disinfectant will be furnished by the company. Great caution is advised in obtaining the supply of drinking water, and in places where the water is suspected of being impure instructions are given to boil it. If at any time a case of infectious disease is found at a station, in a passenger coach or elsewhere on the company's property, a physician should be immediately sent for. The car should be removed from the train as soon as practicable, the doors locked, and it should not again be used until it has been fumigated.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Central Ohio, 3 per cent., on the common and preferred stock, payable July 31.
Central Pacific, \$1 per share, payable Aug. 1.
Cumberland Valley, quarterly, 2 per cent., payable July 1.
Illinois Central, 3 per cent., payable Sept. 3.
Mill Creek & Mine Hill, 5 per cent., payable July 10.
Mt. Carbon & Port Carbon, 6 per cent., payable July 10.
Richmond & Petersburg, 3½ per cent., on the preferred stock, payable July 3.
Schuylkill Valley Navigation & Railroad, 2½ per cent., payable July 10.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:
Hudson Connecting, special, 115 Broadway, New York, July 22.
New Brunswick, annual meeting, St. John, N. B., Aug. 1.
Poughkeepsie & Connecticut, special meeting, 115 Broadway, New York, July 22.
Rutland, annual meeting, Rutland, Vt., July 23.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:
The *New England Roadmasters' Association* will hold its next meeting in Boston, Aug. 21.
The *Roadmasters' Association of America* will hold its seventh annual convention at Denver, Colo., Sept. 10.
The *Master Car and Locomotive Painters' Association* will hold its next annual convention in Chicago Sept. 11.
The *American Association of General Passenger and Ticket Agents* will hold its next semi-annual meeting in Atlanta, Ga., Sept. 17.
The *New England Railroad Club* meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month, except June, July and August. The next meeting will be held Sept. 11.
The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.
The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.
The *Central Railway Club* meets at the Tift House, Buffalo, the fourth Wednesday of January, March, May, August and October.
The *American Society of Civil Engineers* holds its regular meeting on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street, New York.
The *Boston Society of Civil Engineers* holds its regular meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m., on the third Wednesday in each month.
The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.
The *Engineers' Club of St. Louis* holds regular meetings in St. Louis on the first and third Wednesdays in each month.
The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1,122 Gerard street, Philadelphia.
The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.
The *Engineers' Club of Cincinnati* holds its regular meetings at the Club rooms, No. 24 West Fourth street, Cincinnati, at 8 p. m., on the fourth Thursday of each month.
The *Engineers' Club of Kansas City* meets at Kansas City, Mo., on the first Monday in each month.
The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.
The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.
The *Civil Engineers' Club of Kansas* holds regular meetings on the first Wednesday in each month at Wichita, Kan.

Civil Engineers' Club of Cleveland.

A meeting was held June 11, President Warner in the chair and 24 members present. The President announced that several members of the club were leaving Cleveland to accept higher positions. Prof. Michelson has been called to the Department of Physics of the Clark University, Worcester. Mr. James Ritchie, the Secretary, has been appointed General Superintendent of the McKeesport & Belle Vernon Railroad, with headquarters at Pittsburgh, and Mr. Cowles has gone to Youngstown as Engineer of the Youngstown Bridge Co. These recent promotions suggested to the President that this club is getting to be a bank for the surrounding country to draw from. Prof. Morley made an address on the Wave length of the Sodium Light, which was discussed. Mr. N. B. Wood read a paper on Heating, Ventilating and Closet Arrangements of School Rooms, which was discussed at some length.

International Association of Ticket Agents.

A dispatch from Cincinnati, July 16, says: A meeting of ticket agents from all parts of the country was held here yesterday, and the International Association of Ticket Agents was formed. About 100 charter members were enrolled. The following officers were elected: President, William Brown, Cincinnati; First Vice-President, J. O. White,

Boston; Second Vice-President, Henry Libon, St. Louis; Secretary, M. G. Carreh, Cleveland; Treasurer, F. W. Vene-man, Evansville, Ind.; Executive Committee, R. C. Bliss, Cincinnati; S. B. Thompson, Lake City, Fla.; J. A. Miller, Lafayette, Ind.; E. E. Blockley, Wichita, Kan.; S. H. Wallace, Philadelphia; A. O. McDonald, Jacksonville, Fla.; George Deming, Jacksonville, Fla.; John J. Hackett, St. Paul. It was decided to hold the next meeting of the association at Jacksonville, Fla., Feb. 11, 1890. The *Station Agent*, of Cleveland, was adopted as the official organ.

Local Freight Agents' Association.

At the meeting at Buffalo last week the following officers were elected: President, F. C. Nicholas, of Chicago; Vice President, J. H. Pickering, Kansas City; Secretary, John J. Baulch, St. Louis; Treasurer, Walter McMillan, Cincinnati. The next annual meeting of the association will be held at Detroit, July 8, 1890.

New England Road-Masters' Association.

The seventh annual meeting of the Association at the American House, Boston, Mass., Aug. 21 and 22, will be called to order at 1:30 p. m., Aug. 21.

After the regular annual business of the Association there will be discussed the following questions:

Repairs of Track.—1. Method of renewal of rails, frogs and switches. 2. Best method of renewal of ties and tamping of same. 3. Ballasting and surfacing. 4. Maintenance and alignment of tracks on tangents and curves.

Cattle Guards.—Best form of construction and material to use, with estimate of cost.

Fencing.—Best material and form of fence and cost of same.

Necessary Monthly or Weekly Forms for the Rendering of Material Used and Classification of Labor Performed.

—Are the uses of same understood, and give the results desired.

Review of Previous Year's Questions.—Road Tools, Nut Locks, Foot Guards, etc.

The committees on the several subjects will report as each question is opened for discussion.

Revised Rules of Interchange of the Master Car-Builders' Association.

The Code of Rules governing the condition of and repair to freight cars for the interchange of traffic, as revised at the recent convention at Saratoga, and which will go into effect Sept. 1, 1890, will be printed by the Association, in the same form as last year, and sold at the following prices: 25 copies, \$1; 50 copies, \$1.75; 100 copies, \$3; to which will be added the cost of postage when sent by mail. Should any extra printing be required on cover, it will be charged extra, at cost, in each case.

PERSONAL.

—President C. F. Adams, of the Union Pacific, is on a vacation trip to Alaska over the Canadian Pacific.

—Mr. B. J. Hamm, Car Service Agent of the Pittsburgh & Western, and Mr. J. H. Agnew, Master Mechanic of the same road, have tendered their resignations.

—Mr. P. G. Jewett, Superintendent of the Chautauqua Lake Road, having resigned that position, he has been succeeded by Mr. J. Murray Africa, with the title of General Manager.

—Ex-Congressman Edmund Rice, at one time President of the Minnesota & Pacific, the St. Paul & Pacific and the St. Paul & Chicago roads, died in White Bear, Minn., last week, aged 70 years.

—Mr. George S. Morison, Civil Engineer, has removed his Chicago office from 205 La Salle street to The Rookery, Room 1120. His New York office remains at 35 Wall street as heretofore.

—Mr. W. H. Fisher, for three years District Passenger Agent of the Cincinnati, Hamilton & Dayton in Indianapolis, has been appointed General Passenger Agent of the Fort Wayne, Cincinnati & Louisville.

—Col. F. K. Hain, General Manager of the Manhattan (Elevated) Railway Co., has accepted the presidency of the Julian Electric Traction Co., which controls the patents of the storage system for electric street cars.

—Mr. Thomas C. Mendenhall, of Indiana, President of the Rose Polytechnic Institute of Terre Haute, was last week made Superintendent of the Coast and Geodetic Survey. Mr. Mendenhall was born near Hanover, O., in 1841.

—Mr. Francis R. F. Brown, Mechanical Superintendent of the Canadian Pacific Railway Co., has resigned the service of that company, having been offered and having accepted the position of Superintendent of the Dominion Bridge Co., of Canada, at Montreal.

—The directors of the Wheeling & Lake Erie last week elected Mr. M. D. Woodford President of the road, to succeed the late George J. Forrest. Mr. Woodford has been General Manager of this road for three years, and was previously Receiver from July, 1884, to July, 1886. He was recently elected Vice-President of the Cincinnati, Hamilton & Dayton.

—Mr. A. H. Swanson, having resigned his position as Transportation Manager of the Houston & Texas Central, to become Joint Receiver of the St. Louis, Arkansas & Texas, the office which he held on the Houston & Texas Central has been abolished, and Mr. G. A. Quinlan has been made Chief Engineer and General Superintendent of the line, excepting the Waco & Northwestern Division. Mr. Quinlan has heretofore been Engineer and Superintendent of the main line and the western branch of this road.

—Col. L. C. Jones, Superintendent of the Carolina Central died in Wilmington, N. C., July 10, of heart failure, after a short illness. He was born in Richmond in 1830. In 1852 he became Assistant Engineer of the Brunswick & Florida road, since which time he has continued in railroad service. He has served successively as Assistant Engineer on the Covington & Ohio, the Dubuque & Pacific and the Western of North Carolina. Of this latter road he was also President. In January, 1883, he became Superintendent of the Carolina Central.

—Mr. Alfred Walter, Superintendent of the Sunbury Division of the Pennsylvania, has been appointed General Superintendent of the Baltimore & Ohio east of the Ohio River, to succeed Mr. W. M. Clements, who recently resigned. Mr. Walter has been Superintendent of the Pennsylvania's Sunbury Division since October, 1882, and was previously for a short time engineer in the motive power department of the road. He was born in Brooklyn, October 2, 1851, and entered railroad service in 1872 as rodman of an engineer corps. He has since been Assistant Engineer of the Allegheny Valley; Assistant Supervisor of the Pennsylvania from May 1, 1876 to May, 1878; Supervisor of the Northern Central and Assistant Engineer of the Northern Central and Baltimore & Potomac roads from December, 1881, to October, 1882.

ELECTIONS AND APPOINTMENTS.

Adirondack.—The following officers have been chosen: R. Suydam Grant, President; H. G. Young, Vice-President; C. A. Walker, Secretary and Treasurer. The road is now operated as the Adirondack Division of the Delaware & Hudson Canal Co., and the jurisdiction of the officers of that company has been extended over it.

Alabama Midland.—The following board of directors was elected at a meeting of stockholders in Montgomery, July 10: O. C. Wiley, C. J. Knox, Troy; J. F. Joseph, Montgomery; John E. Donaldson, Bainbridge, Ga.; A. St. Clair Tenille, L. Henderson, Troy; M. K. Jessup, J. B. Newcomb, W. S. Chisholm, New York. The board of directors held a meeting and the following officers were elected: O. C. Wiley, President; J. B. Newcomb, Vice-President; W. F. Joseph, Secretary; J. C. Henderson, Treasurer; A. A. Wiley, General Counsel.

Albert Southern.—A meeting of the directors of the road was held recently, when A. E. Killam, M. P. P., was elected President, and W. A. Trueman, Secretary and Treasurer.

Astoria & South Coast.—William Reid, of Portland, Ore., has been elected President, to succeed John A. Devlin, of Astoria, resigned.

Augusta & West Florida.—Jesse Thompson, W. M. Mercer, and J. P. Verdery, T. C. Hogue, T. R. Green and C. E. Smith of Washington; T. J. Dempsey of Jackson, Ga.; A. T. MacIntyre, Jr., S. G. McLendon and A. P. Wright of Thomasville, Ga., have organized this company.

Baltimore & Ohio.—The Board of Directors this week confirmed the following appointments: Alfred Walter as General Superintendent of the lines east of the Ohio River, to succeed W. M. Clements, resigned; Col. H. T. Douglas, the present Chief Engineer of the Philadelphia division, as Chief Engineer of the entire system; J. M. Schryver, the present Assistant General Ticket Agent, as Assistant General Passenger Agent east of the Ohio River, and O. P. McCarty, as Assistant General Passenger Agent west of the Ohio River, the office of General Ticket Agent having been abolished and consolidated with the passenger department.

Chautauqua Lake.—Hon. J. M. Gazzam, President, and F. G. Jewett, Superintendent, of this company having resigned, the following changes were made in the officers of the company July 9: A. O. Granger, Philadelphia, Pa., was elected President; J. Murray Africa, Jamestown, N. Y., was elected General Manager.

Chicago & Atlantic.—E. C. Murphy, who was recently appointed Superintendent, has resigned, and C. L. Mayne has been appointed Acting Superintendent to succeed him.

Chicago, Peoria & St. Louis.—The following are the directors of the consolidated road: Isaac L. Morrison, Wm. S. Hook, Marcus Hook and Francis Hook, of Jacksonville, and Wm. T. Barbee, of Lafayette, Ind.

Cleveland, Cincinnati, Chicago & St. Louis.—W. C. Irwin has been appointed Chief Engineer of Maintenance of Way of all the lines of this company, with office at Cleveland, O.

Colorado Midland.—H. Collbran, Assistant Manager, has been promoted to the position of Acting General Manager, with headquarters at Colorado Springs. He will also continue to perform the duties of Traffic Manager.

Denver, Texas & Gulf.—W. V. Newlin has been appointed General Freight Agent, vice J. H. Lawler, assigned to other duties.

Ellensburg & Northwestern.—This company has just been incorporated in Washington Territory. Following is a list of the first officers: President, John A. Shondy; First Vice-President, Thomas L. Nixon; Second Vice-President, George W. Elliott; Secretary, J. C. Lloyd; Treasurer, W. R. Abrams; Manager, M. J. Maloney; Attorneys, Parsons & Caldwell.

Falls Creek.—The incorporators of this Pennsylvania road are: Henry K. Wick, Youngstown, Ohio, President; Robert H. Williams, Oak Ridge, Pa., and Frank Morrison, Sharon, Pa.

Fort Wayne, Cincinnati & Louisville.—W. H. Fisher has been appointed General Passenger and Ticket Agent of this and the Whitewater Valley Roads, with headquarters at Fort Wayne, Ind.

Fremont, Elkhorn & Missouri Valley.—W. C. Halsey having resigned his position as General Superintendent of the line, P. C. Hughes, Superintendent of the Black Hills Division, has been appointed to succeed him.

Green Bay, Winona & St. Paul.—J. B. Last has been appointed Assistant General Freight and Passenger Agent, with headquarters at Green Bay, Wis.

Houston & Texas Central.—A. H. Swanson having resigned as General Transportation Manager, that office has been abolished. George A. Quinlan has been appointed Chief Engineer and General Superintendent, with charge of the roadway, rolling stock, stations, and handling of trains, except on the Waco & Northwestern division, which will remain in the charge of Superintendent J. M. Lee. Officers heretofore reporting to the General Transportation Manager, with the exception of those connected with the branches of the service placed in the charge of Mr. Quinlan, are hereafter to report directly to Charles Dillingham, Receiver. A. W. Little has been appointed Superintendent of the first division, comprising all that portion of the main line from Hearne south, and the western branch from Hempstead to Austin. L. A. Daffin has been appointed Superintendent of the second division, comprising all that portion of the road and the branches north of Hearne except the Waco & Northwestern division.

Indianapolis Union.—V. T. Malott, Receiver of the Chicago & Atlantic, last week tendered his resignation as Vice-President and General Manager of the Company. M. E. Ingalls was elected President, W. R. McKeen was elected Vice-President, and W. R. Jackson, Secretary and Treasurer.

Louisville & Nashville.—H. T. McDaniel has been appointed Assistant Engineer to R. E. O'Brien, Engineer in Charge of the Cumberland Gap extension to the connection with the Norfolk & Western at Prince's Flat.

Missouri River, North Platte & Denver.—At a meeting of the stockholders of the company, held in Albion, Neb., July 10, the following were elected directors: Loran Clark, F. M. Sackett, of Albion; S. S. Hadley, of Cedar Rapids; T. C. Patterson, H. B. Hinman, T. J. Foley, of North Platte; and D. C. Hall, of Sciota. Loran Clark was elected President, T. C. Patterson, Vice-President, T. H. Smith, Secretary, and T. J. Foley, Treasurer.

Neversink Mountain.—The incorporators are: W. D. Smith, Reading, President; Henry T. Kendall, Richard T. Leaf, C. Leoser and Wm. McIlvain, Reading, Pa.; George Brooke, Birdsboro, Pa., and Joseph V. Kendall, Kansas City, Mo.

Northern Pacific.—John F. Sheehan has been appointed

Freight Agent of this company and of the Wisconsin Central with office at No. 111 South Ninth street, Philadelphia.

Rolfe & Northern.—The incorporators of this company are as follows: John J. Henry, Germantown, Pa.; Charles W. Henry, Chestnut Hill, and J. Bayard Henry, James Bayard, Jos. D. Potts, Stephen Green, Edw. J. Aledo, all of Philadelphia.

St. Paul & Duluth.—A. J. Callahan has resigned as Purchasing Agent and W. N. Schaff has been appointed Assistant Purchasing Agent in charge of that department.

Savannah, Americus & Montgomery.—The annual meeting of the stockholders of the road was held in Americus, Ga., last week, and officers were re-elected as follows: S. H. Hawkins, President; S. C. Cooper, Treasurer; R. E. Hardaway, Superintendent.

Seattle, Lake Shore & Eastern.—Since the appointment of the new board of trustees on June 15 the following changes in the management and officers of the road have been made: Paul F. Mohr, formerly Chief Engineer, succeeds D. H. Gilman as Vice-President; F. W. D. Holbrook succeeds W. R. Thorneill as Manager; E. W. Ruff succeeds F. A. Allen as General Freight and Passenger Agent; E. F. Cassell succeeds M. K. Jones as Trainmaster; W. T. Preston and J. W. Danmore succeed James H. Watson as Superintendent of Buildings and Bridges, and Roadmaster respectively; George H. Park succeeds G. B. Cliffe as Seattle Agent; succeeds W. E. Burgess as Purchasing Agent. Aside from these changes, many old conductors, brakemen, switchmen and others have been removed.

Southern Pacific.—The office of Assistant General Freight Agent having been abolished, C. W. Bein has been appointed General Freight Agent of the Atlantic system, with headquarters at New Orleans.

Wheeling & Lake Erie.—M. D. Woodford has been elected President to succeed the late George J. Forrest.

Winnipeg Transfer.—The directors of this company are: President and Manager, G. R. Crowe; Board of Directors are: G. R. Crowe, Hon. D. H. McMillan, D. E. Sprague, H. Rutan, W. W. McMillan and A. Moffat.

Wisconsin Central.—Louis Eckstein, Assistant General Passenger and Ticket Agent, now has immediate charge of the passenger and ticket department. J. B. Cavanaugh, Assistant General Freight Agent, has immediate charge of the freight department. J. C. Mackinnon has been appointed Assistant General Freight Agent.

OLD AND NEW ROADS.

Abbotsford & Northeastern.—P. S. Loy & Co., of De Pere, Wis., who have the contract for grading this road, have commenced work, and expect to have it completed from Abbotsford northeast, to Black Creek Falls, Wis., 15 miles, by Sept. 1. Linton Williams, of Black Creek Falls, is Chief Engineer.

Arcadia, Alexandria & Ft. Smith.—The contracts will soon be let for building 15 miles of this road from Arcadia, La., north toward Alexandria, 100 miles from Arcadia. The surveys have been made for about half this distance. A. L. Atkins, of Arcadia, is President, and L. W. Polk, of Delhi, La., is Chief Engineer.

Augusta & West Florida.—This is a proposed line from Augusta, Ga., southwest to the Florida State Line, at a point in Thomas County, and thence to Tallahassee, Fla. A charter will soon be applied for.

Baltimore & Ohio.—The following table gives the earnings and expenses for June, 1889, as compared with June, 1888 (June, 1889, approximated):

Month of June.	1888.	1889.	Inc. or Dec.
Earnings.....	\$1,702,489	\$1,783,331	I. \$80,842
Expenses.....	1,197,283	1,237,083	I. 39,800
Net earnings.....	505,206	\$546,248	I. \$41,042
Year to June 30.	1888.	1889.	
Earnings.....	\$14,975,802	\$15,163,514	I. \$187,712
Expenses.....	10,749,867	11,031,930	I. 282,063
Net earnings.....	\$4,225,935	\$4,131,584	I. \$94,351

Brierfield, Blackton & Birmingham.—It is stated that the contract for building this extension of the East Tennessee, Virginia & Georgia from Montevallo, Ala., to Blackton and Birmingham, Ala., has been let to Carey Bros., of Birmingham.

Cairo, Vincennes & Chicago.—On July 13 a mortgage was filed at Springfield, Ill., by Anthony J. Thomas and Charles E. Tracey, of New York. Trustees in the Cairo Division of the Wabash, St. Louis & Pacific, dated Oct. 1, 1881, conveying all equipment, franchises, etc., of the Cairo Division of the Wabash running from Cairo, Alexander County, to Tipton, Vermillion County, together with a branch extending from St. Francisville, in Lawrence County, to Vincennes, Ind., to the Cairo, Vincennes & Chicago Co. for the sum of \$5,000,000. The bonds bear interest at 4 per cent.

Canada & St. Louis.—An order for the sale of the road extending from Goshen to Sturgis, Mich., has been issued, and Thomas A. Starr, Receiver, has been appointed commissioner to sell the property. The sale will take place Aug. 20. No bids are to be received for a less amount than \$225,000, and \$10,000 forfeiture is to be deposited by the purchaser. There is an indebtedness on the property amounting to \$200,000, which will be paid out of the purchase money.

Centralia & Chester.—The Centralia & Ste. Genevieve and the Centralia & Altamont roads have been consolidated with this company, giving it a charter for a line from Altamont to Ste. Genevieve, Ill. The road is now being operated between Sparta and Coulterville, Ill.

Chapeake & Nashville.—Engineers are still surveying for this company's proposed extension northwest to Harrodsburg, Ky. A survey has just been completed from Harrodsburg southwest to Lebanon, and it will be continued through Bowling Green to Scottville, the northern terminus of the road.

Chicago, Burlington & Northern.—Engineers have been busy this week surveying a new line from a point on the main line of the road on the Wisconsin side of the Mississippi River across to Red Wing, Minn., and then west.

Chicago Elevated Roads.—The Chicago Tribune has a column article reviewing the present status of the schemes for building elevated railroads in that city. It says:

There is a combination of three requirements necessary to build an elevated railroad—the consent of a majority of the property-owners on every mile of the route, a satisfactory ordinance, and money.

There have been eight companies incorporated to give Chicago rapid transit. Some of the schemes have money and the consent of the property-owners, but no ordinance. Others lack only the consent of the property-owners, and still others only need money. Three companies have been

granted ordinances by the Council, two ordinances have been accepted, and a cash forfeit of \$100,000 deposited with the City Treasurer by each company. Progress seems to have stopped there.

The Chicago & South Side Rapid Transit was granted an ordinance March 26, 1888. It proposes to buy property between State street and Wabash avenue and run south to the city limits. A cash deposit of \$100,000 was made a year ago, and a bond for a similar amount was also furnished. The cash is to be forfeited if a mile of road is not finished within two years. The head of this company is C. F. Wolcott, and his associates are mostly New Yorkers. The company has extensive offices in Chicago, and 10 surveyors are at work in Hyde Park, but the bonds do not seem to sell well thus far.

The Meigs Lake Shore Elevated was authorized Dec. 28 last, and has deposited \$100,000 cash and a bond for \$500,000. Mike McDonald and P. H. Rice are interested in this company, but there are no visible signs of life in it. The property owners object to the Meigs style of elevated road, and demand that the line be built on a structure similar to those in New York City, which increases the first cost over the estimates made by the company.

Another project is the Hannab's Elevated Street Railway, whose projectors say they have ample funds, but they have been refused an ordinance. They have the consent of the majority of the property owners for a distance of five miles on Milwaukee avenue. They will soon make renewed application for an ordinance.

The Consolidated Rapid Transit and Elevated Railway proposes to build on State street, and claims to have money, but has not secured an ordinance. It has extensive offices, elegantly furnished, but the reporter never found any body there except a young woman doing fancy sewing.

The West Chicago Rapid Transit Co. wants to build in Randolph street and Ogden avenue. The Vice-President is T. B. Bryan, who says that, if the city will grant an ordinance, the road will be built, but not one-millionth part of a cent will be paid for an ordinance. Responsible contractors offer to build the road and take pay in bonds. The directors of this company are: P. B. Wear, E. N. Blake, William Ripley and George Wood.

The Underdonk West Side Elevated secured an ordinance, but would not accept it. There are some strong names connected with the enterprise, among whom are J. J. P. Odell, William D. Howard, James Deering, William G. McCormick and George S. Willits.

The Chicago Remunerating Elevated Railroad has made big demands of the city, but, apparently, has no financial strength.

An underground line has been proposed on Monroe street from Michigan avenue to the city limits, and the scheme is said to have some strong backers.

Chicago, Kansas City & Texas.—The road was opened to passenger business this week from North Kansas City to Linden, Mo., nine miles.

Chicago, Milwaukee & St. Paul.—The United States Trust Co., of New York, has filed in Illinois a release of a mortgage held against the Chicago, Milwaukee & St. Paul, and the Chicago, Evanston & Lake Superior road. The mortgage was executed in September, 1888, and was for \$50,000, to secure additional tracks and terminal facilities in Chicago, and to build an extension in northern Wisconsin. The bonds were to run until 1918, but the new general mortgage on the entire system will cover this property.

The company has appointed C. J. Eddy General Agent at Portland, Ore., with charge of the business in Oregon and Washington and on the Northern Pacific and Oregon Railway & Navigation Company's lines in Idaho.

Chicago, Peoria & Springfield.—Articles of consolidation of the Chicago, Peoria & Springfield and Peoria, Springfield & St. Louis roads, forming part of the Jacksonville Southeastern line, were filed at Springfield, Ill., July 11, under the former name. Capital stock is \$2,500,000.

Chicago, St. Paul, Minneapolis & Omaha.—Justice Harlan, of the United States Supreme Court, has dismissed the bill of complaint and decided in favor of the railroad company in the suit brought against it by the Farmers' Loan & Trust Co., of New York. The case of Mrs. Sarah Angel, of Chicago, against the road was likewise decided in favor of the defendant. About \$1,500,000 was involved in the two cases. Many years ago the trust company floated bonds to the amount of \$1,000,000 for the Portage & Superior road, which afterwards collapsed. An enormous land grant, which it had previously received, was afterwards transferred to the Omaha road, and the suit was brought by the trust company to obtain a lien on the land grant, secure the payment of the amount due it from the defunct company. Mrs. Angel is the widow of a contractor who was grading the Portage & Superior line when the company went under. He sued to recover the money due him, but, dying suddenly, his widow continued the litigation, and was awarded \$35,000 by the District Court, which amount was subsequently reduced to \$25,000. Mrs. Angel then sought to make the judgment a lien on the Omaha company.

Chicago & West Michigan.—At the special meeting held in Muskegon, Mich., last week, the stockholders formally approved the action of the directors in deciding to extend the road from Baldwin to Traverse City. As already stated, bids have been asked for grading the line.

Cincinnati, Jackson & Mackinaw.—The survey is now being made for the proposed extension from Addison north to Jackson, Mich., about 20 miles.

Cincinnati, Washington & Baltimore.—The Directors of the Baltimore & Ohio, at their meeting this week, approved the plan for the reorganization of this road and the formation of a new company. It provides for the sale of the road under foreclosure of the first mortgage, a decree for that purpose having already been entered in the Cincinnati courts. A new mortgage is to be created, securing bonds to the amount of \$11,000,000, the principal and interest of which are to be guaranteed by the Baltimore & Ohio. The \$11,000,000 of bonds will take up the present first mortgage bonds, the Baltimore Short Line bonds and the Cincinnati, Washington & Baltimore Hocking Valley bonds, the remainder to be used in securing an exchange of old and new bonds and in improving the road. The total fixed interest charge of the new company will be reduced from \$700,000 to \$495,000. The plan provides for the exchange of all the bonds and a portion of the coupon indebtedness by the issue of a new mortgage of \$11,000,000, in which mortgage is funded all of the interest on the old bonds that will mature in 1893, including Jan. 1, 1890; and also providing for about \$600,000 for the exchange of the securities and for the new company's use. These bonds will run for 100 years, bearing 4½ per cent. interest per annum, commencing July 1, 1890, and guaranteed by the Baltimore & Ohio. All of the holders of the respective first mortgage bonds and liens will have the right to exchange these bonds on the terms stated in the plan. They are all to be exchanged at par except the Cincinnati, Washington & Baltimore 7 per cent. bonds, which will re-

ceive a premium of about 17½ on the new bonds. The holders of the old first mortgage 4½ per cent. bonds will, therefore, have a right to exchange their holdings for the new bond, which will be an actual first mortgage upon the property, with an interest charge, which, is estimated within the capacity of the road to earn. The company will also issue \$6,400,000 of second income bonds. The assessments will be 5 per cent. on the second mortgage bonds, 4 per cent. on the third mortgage bonds, 2½ per cent. on the first income bonds, 2 per cent. on the second income bonds, \$1 a share on the preferred stock and 50 cents on the common stock.

Clarksburg, Weston & Midland.—A. M. Wisher has been given the contract for changing the gauge of this West Virginia road, which is 25 miles long, from narrow to standard, the work to be completed Dec. 15.

Columbia, Newberry & Laurens.—Rice & Coleman, of Chester, S. C., who contracted to build the trestles on this road between Columbia and Newberry, S. C., for the Congaree Construction Co., have also contracted to grade 18 miles of the road, completing it to Newberry.

Columbus, Lima & Milwaukee.—Grading on this line was commenced about a mile north of Lima, Ohio, July 11. Six hundred men are to be at once put to work on the section from Lima to Defiance, Ohio, 125 miles, the contract for building which was awarded some time ago to Stephen G. Clarke, of Chicago. The road is projected to extend from Floodwood, Ohio, to Saugatuck, Mich., 364 miles, the preliminary survey for which has been made.

Elmira, Cortland & Northern.—A survey is said to be in progress from Elmira, N. Y., to Williamsport, Pa., to connect this road with the Philadelphia & Reading at Williamsport. The same report was current at this time last year.

Fairhaven & Southern.—At a recent meeting of the stockholders it was voted to increase the capital stock from \$1,000,000 to \$6,000,000. It was also voted to build north to the Canadian Pacific to connect with that company, the line to be run between Mission and New Westminster, B. C. Engineers and surveyors will be put to work immediately. The road now being graded south of Fairhaven will be extended.

Falls Creek.—Incorporated in Pennsylvania to build a road from a point near Falls Creek Station, on the Allegheny Valley and the Buffalo, Rochester & Pittsburgh, in Clearfield County, to Loudon Mines, in Jefferson County, a distance of four miles. The capital stock is placed at \$30,000.

Florida.—A company has been organized at Thonotosassa, Fla., to build a road from that point, via Seffner and Bloomingdale south through Hillsboro County.

Georgia.—Bills have been introduced in the Legislature to incorporate the Fort Payne & Eastern and the Cumming & Warsaw roads; also a company to build a dummy line from Chattanooga, Tenn., to the Chickamauga battlefield.

Grand Rapids & Mineral Springs.—Contracts will be let this week for building this short Michigan road, which is to extend from Grand Rapids to Mineral Springs, 2½ miles. The line will connect the Detroit, Grand Haven & Milwaukee and the Lake Shore & Michigan Southern, and the Chicago & West Michigan roads. C. S. Edwards is President and F. W. Stevens is Chief Engineer, both of Grand Rapids.

Illinois Central.—The earnings from traffic for the first six months of 1889 and 1888 (June, 1889, estimated) are given in the following table:

	1889.*	1888.	Inc.
Miles.....	2,275	1,953	322
Gross earn.....	\$6,406,770	\$5,451,591	\$955,179
Less:			
Oper. exps. and taxes....	4,039,570	3,811,405	228,165
Perm. expenditures.....	109,846	61,789	48,057
Total.....	\$4,140,116	\$3,576,194	\$563,922
Net earnings.....	2,266,354	1,575,400	690,954

* Including the earnings and expenses of the Memphis Division, 100 miles, for the six months ended June 30, 1889.

Johnsonburg.—The Pennsylvania has leased this road, running from Johnsonburg, Elk County, on the Erie Railroad to Clermont, McKean County, Pa., 20 miles. The line will be operated as a part of the Pennsylvania's middle division.

Kansas City & Beatrice.—This company, which was recently organized to build the proposed extension of the Kansas City, Wyandotte & Northwestern to Beatrice, Neb., is filing in Nebraska a mortgage for \$400,000, given to the New York Security & Trust Co. Beatrice has been asked to vote \$50,000 to aid in building the road.

Kickapoo Valley & Northern.—This company has secured the right of way for 40 miles, and has about 80 miles under way. The proposed road is to extend from Woodman, Wis., to Waukesha and Soldiers' Grove, and thence north 150 miles. The grades are light and the curves easy. It is claimed that contracts will be let in October for part of the line. James Applebee is Chief Engineer and B. F. Washburne, of Excelsior, Wis., is a director.

Knoxville Southern.—S. P. Condon has contracted for constructing the road through the mountains south of the Hiwassee river and between that stream and Ducktown, Tenn. There are three tunnels to be cut, one 1,200 ft., one 700 ft. and one 300 ft.

Little Rock & Alexandria.—It is stated that a construction company has been formed to build this road from Little Rock, Ark., through Farmerville to Alexandria, La. It is announced that grading will begin Aug. 13.

Louisiana, North & South.—At a meeting of the company, to be held early next week, some definite action will be taken regarding the proposed extensions of the road, and it will be decided whether to build them this year or not. The first work to be commenced will probably be an extension north toward the state line from the present northern terminus at Homer, La.

Louisville & Nashville.—The contract for building the first ten miles of the 23-mile section of the Cumberland Gap extension, recently referred to in these columns, was let last week. Mason, Gooch, Hoge & King, of Frankfort, were awarded the first 2 miles of very heavy work, and including a tunnel 1,100 ft. long. R. J. McCann, of Lancaster, Pa., was given the next 8 miles. The first 2 miles are to be completed March 1, 1890, and the 8 miles April 1.

Louisville, New Albany & Chicago.—On July 15, the trains of this road which have run into Louisville over the Pennsylvania Company's bridge, commenced using the bridge of the Kentucky & Indiana Bridge Co. The agreement to do this was the cause of much litigation, which was decided some months ago in favor of the Kentucky & Indiana Bridge Co.

Louisville, New Orleans & Texas.—The Bayou Sara branch from Slaughter, La., to Bayou Sara, La., a distance

of 15 miles, was completed last week, the last spike being driven July 8. The road will not be opened for traffic for some time, as considerable leveling and ballasting will be necessary.

Louisville, St. Louis & Texas.—Tandy & Corrigan, of Owensboro, Ky., have contracted to build the branch from Irvington to Hardinsburg, Ky.

Melon Belt.—Dr. E. A. Jells and others, of Quitman, Ga., have applied for a charter for this company to build a railroad from Quitman on the Savannah, Florida & Western northeast to Adel, about 30 miles distant.

Missouri, Tennessee & Georgia.—The permanent survey of the road will be commenced in about six weeks, and the work of construction will begin soon after that. It is the intention of the projectors to build 85 miles of the road at once from Humboldt, Tenn., to Hickman, Ky. The route is from Humboldt to Gibson Wells, thence across the North Fork of the Forked Deer River to Newbern, on the Chesapeake & Ohio, 85 miles above Memphis; thence across Obion River and Reelfoot outlet northwesterly to Tiptonville; thence northerly along Madrid Bend to Hickman. It is intended to build a levee from Tiptonville to Hickman, a distance of 20 miles. The country that the new road will run through is mostly rich table land that grows cotton, corn and wheat. It is heavily timbered with poplar, white oak and other valuable woods. L. B. Wright, of Humboldt, is President and J. L. Williams is Chief Engineer.

Monterey & Mexico Gulf.—The directors and stockholders of the company have filed a resolution authorizing mortgage on the road for \$25,000 a mile.

Nebaska, Kansas & Southwestern.—This company has filed a charter in Kansas, with a capital stock placed at \$2,225,000 to build 250 miles of road in the southern part of Kansas. The headquarters are at Hutchinson.

Neversink Mountain.—This company has been chartered in Pennsylvania to build a road from a point on the Philadelphia & Reading, at or near the breast of the big dam in Exeter Township, Berks County, and running up, over and around the Neversink Mountain, to the city of Reading, Pa. The road will be about 9 miles long. The capital stock is \$100,000.

New Roads.—A survey is being made from Madisonville northeast to Owensboro, Ky., 35 miles, for a proposed railroad, and a charter will be asked at the next session of the legislature.

W. J. Crawford, W. B. Mallory and others are securing right of way for a proposed road from Memphis to Raleigh, Shelby County, Tenn., a distance of about 10 miles.

James B. Jordan, Newbern, Va., invites proposals for building seven miles of standard gauge road in Tennessee, the contractor to take in payment the first mortgage 6 per cent. bonds of the company, the guaranteed annual revenue of which is about one-half the first cost of the road.

New York, New Haven & Hartford.—Plans are being prepared for double tracking the Shore Line Division between South and East Lyme, Conn. It is expected that the new track will be in use by the middle of August. It is not probable that any further double-tracking will be done on this division before the fall.

Northern Pacific.—Corrected returns of the new track laid by this company show that it has laid 78 miles this year. It has under construction 167 miles, as follows: From Little Falls, Minn., to St. Louis, Minn., 33 miles; from Minneapolis to Leeds, 15 miles; from Gallatin to Butte, Mont., 70 miles, and from Dayton to Almira, Wash., 46 miles. The contractors for this work are Win-ton Bros., of Minneapolis; E. McCormick, of St. Paul, Neb.; Green & Keefe, of Helena, Mont.; and Woods, Larsen & Co., of Minneapolis and Helena.

The Tacoma, Orting & Southeastern road, a division of this road, has been completed from Orting, Wash., near Tacoma, southwest to the Puyallup River, a distance of 7 1/2 miles.

Pacific Midland.—The surveyors under George M. Nix, running the line for this company from Sioux Falls, Dak., to Puget Sound, are now in the Big Horn Mountains, just east of the Yellowstone Park. A grade of 2 per cent. will be necessary to get over these mountains, the height of the crossing being about 8,500 ft.

Pacific Short Line.—It is stated that by Aug. 15 the company will be ready to advertise for bids for 110 miles of road east of Ogden City, Utah, and for a second 110 miles westward in Nebraska. The company expects to have half of the 960 miles of road built by Jan. 1. The survey east from Ogden has been finished for about 30 miles to Morgan County. This section is rough, and two tunnels will have to be cut through the second range of mountains, one of which will be 1,200 ft. long.

Paducah & Tennessee.—The town of Paducah, Ky., last week voted to subscribe \$50,000 to this road, and the general contractors, McIntyre & Concanon of St. Louis, have awarded to Johnson Bros., of Illinois, a contract for grading and bridging 20 miles from Paducah. They will commence work this month.

Perry County.—It is expected to have this road completed by October from New Bloomfield to Duncannon, Pa., 11 miles. It is being built by McGovern & Co., of Tyrone, Pa.

Port Arthur, Duluth & Western.—Port Arthur, Ont., has voted the company \$25,000, which now has a government guaranty, a provincial donation, together amounting, it is understood, to some \$7,500 per mile, and the subsidy from Port Arthur west for many miles, and it is claimed that grading will be commenced immediately. H. K. Wickstead, of Brantford, Ont., is Chief Engineer.

Orlando & Indian River.—E. R. Gunley, M. R. Marks, E. K. Foster and others have chartered this road in Florida to build from Orlando south to Lake Worth, through Narcoossee and Melbourne.

Richmond, Nicholasville, Irvine & Beattyville.—Proposals are invited until Aug. 5 for the grading, tunneling, masonry and trestling between Richmond and Beattyville, Ky., 57 miles. Bids will be received by the sections or as a whole. Profiles can be seen at the office of the Chief Engineer, J. H. Pearson, at Nicholasville.

Rolle & Northern.—The charter of this company has been filed in Pennsylvania to build a road from a point on the line of the Philadelphia & Erie at Rolle, Elk County, to a point northwesterly, called Broad Level, in the same county, a distance of about 20 miles. The capital stock is \$200,000.

Rome & Carthage.—The survey for this road has been completed from Rome, N. Y., north, for a distance of 45 miles, through Martinsburg to near Lowville, on the Rome, Watertown & Ogdensburg.

St. Louis & Chicago.—Under a decree of the United States Court, the road will be sold at Master's sale in Spring

field, Ill., Sept. 5. The mortgage bondholders are the American Loan & Trust Co., of New York, for \$1,100,000, and the Mercantile Trust Co., of New York, \$500,000. Wade & Hopkins are judgment creditors for the sum of \$23,000.

San Antonio & Aransas Pass.—McCarthy, Kerrigan & Co., of Little Rock, have taken a contract on the Waco branch between Waco and Giddings, Tex. It is expected to complete the Waco branch by Jan. 1, 1890, from West Point, in Fayette County, north through Giddings, Lexington, Rockdale and Cameron to Waco, 120 miles. The line from Gonzales via Luling to Lockhart, in Caldwell County, 34 miles, will be completed by Sept. 1.

Sandusky, Columbus, Lake Erie & Southern.—The preliminary survey has just been finished from Sandusky south to Columbus, O., a distance of 108 miles. The line runs through Bellevue, Attica, Bucyrus and Delaware to Columbus. Another line will run from Sandusky, through Gailton, Mt. Gilead and Bellevue, to Columbus.

Seattle, Lake Shore & Eastern.—The location north of the Skagit River has been completed for about 10 miles, the maximum grade being 1.4. This is the most difficult part of the line, and the engineers working north expect to meet those working south from the international boundary in about three weeks. It will be necessary to build about 80 miles to connect with the branch of the Canadian Pacific.

Sioux City & Northern.—Several contractors are reported engaged in grading this road at several points. It is to extend north from Sioux City, Ia., to a connection near Palisades, Dak., with the St. Paul, Minneapolis & Manitoba, in whose interest the road is to be built.

Stuttgart & Arkansas River.—The contract for building the road has been given to T. H. Leslie, of Stuttgart, Ark., one of the directors. The road is chartered to build from Stuttgart to Arkansas Post, 45 miles.

Tobacco Belt.—This road is being extended north about 4 miles from near Madison, Fla., to a connection with the Georgia Southern & Florida at near Bellevue, Fla. About eight miles of the line is now being operated, and when the northern extension is completed it is proposed to build south via Mosely Hall and Perry to Cedar Keys, about 98 miles. W. S. Jordan, of Madison, is General Manager.

Toledo, Ann Arbor & North Michigan.—Work has been commenced on the extension from Mt. Pleasant and Westerly to Big Rapids, Mich., 40 miles. It is proposed to continue this extension north to Manistee, on Lake Michigan.

Troy & Boston.—The trustees of the road were, on July 13, served with notices from President Phillips, of the Fitchburg, that unless the former pay to the Fitchburg \$221,552 before Sept. 15, the latter will sell at auction the stock of the Troy & Boston, some \$330,000, retained by the Fitchburg at the time of the consolidation of the two roads. The money demanded has been paid by the Fitchburg on account of the Troy & Boston since the consolidation, in addition to the \$300,000 provided in the articles of agreement.

Utah & Delaware.—It is stated that the company has adopted a plan under which a new issue of 5 per cent. bonds, amounting to \$2,000,000, will be made, the bonds to run 40 years. These new bonds will be used to retire all existing bonded indebtedness, the balance to be applied on the improvement and extension of lines. The plan has been adopted by the stockholders, and it has the approval of nearly all the bondholders.

Union Pacific.—The earnings and expenses for May are reported as follows:

Month of May:	1889.	1888.	Inc. or Dec.
Gross earnings.....	\$3,041,124	\$3,019,994	I. \$20,130
Operating expenses.....	1,816,264	2,019,264	D. 202,721
Net earnings.....	\$1,224,861	\$991,729	I. \$232,852
Jan. 1 to May 31:			
Gross earnings.....	\$13,301,070	\$14,235,149	D. \$934,079
Operating expenses.....	9,211,115	9,387,246	D. 176,130
Net earnings.....	\$4,089,954	\$4,847,903	D. \$757,948

Washington County.—The survey for this road has been completed from Greenwich, N. Y., through East Poughkeepsie to Rutland, Vt. It is stated that the line may be consolidated with the Clarendon and Pittsford road and with the proposed Greenwich & Johnsonville road, 14 miles long.

Weatherford, Mineral Wells & Northwestern.—This company, which has been securing right of way and subscriptions to build a road from Weatherford northwest to Mineral Wells, Texas, has been incorporated in that state by W. Sand, R. L. Stone, of Kansas City, and others, with a capital of \$600,000.

Wilmington & Weldon.—Tracklaying is now in progress on the extension from near Bethel, south to Greenville, N. C., 14 miles, the grading being all completed.

Winnipeg Transfer.—Much of the right of way has been secured for this road, which is to be built from Argyle street, Winnipeg, Man., to Hudson Flats, about one mile, most of which will be double track. The line is to connect the Canadian Pacific and the Northern Pacific & Manitoba.

TRAFFIC.

Traffic Notes.

Passenger rates from Denver to Chicago were on July 13 ordered restored to \$30.65. It is understood that the Chicago & Alton is willing to restore the westbound rate.

The Wabash is accused of selling through tickets from St. Louis to New York, via Chicago, at \$31.50, a rate which enables the scalpers to handle the tickets at a profit.

The Pennsylvania has announced a reduction of 50 cents a ton in the rates on anthracite coal from the mines to Chicago. Beginning on July 19, the rate will be \$3.50 instead of \$4.

It appears that the westbound rates from the Atlantic seaboard to Minneapolis are on the basis of 75 cents per 100 lbs., via the Soo line. The announcement that they would be placed on the basis of 85 cents was not carried into effect.

The Pittsburgh, Cincinnati & St. Louis has filed a complaint with the Inter-state Commerce Commission against the Baltimore & Ohio, alleging that the latter company has violated the law in naming a rate of 2 cents per mile for parties of ten or more traveling together.

The recent adjustment of bullion rates from Utah and from Denver to the Missouri River by the Executive Board of the Inter-state Commerce Railway Association, has disturbed rates on that commodity from El Paso, and the Missouri Pacific, Atchison, Topeka & Santa Fe and other roads interested in El Paso traffic have complained.

The Grand Army of the Republic threatens to abandon their proposed meeting at Milwaukee in August because the

railroads will not make round trip rates of one cent per mile each way. It is said that the two roads between Chicago and Milwaukee would probably be crowded with traffic, and that therefore it is not for their interest to make a rate lower than half price.

The Inter-state Commerce Railway Association.

The meeting of the presidents of the roads in this association at Chicago, reported in our last issue, adjourned on July 11, but there is no report of any definite action having been taken, except the passage of resolutions to the effect that Northwestern rates are now too low, and that all possible means should be taken to place them upon a more reasonable basis. Negotiations with the Chicago & Alton, and with the Chicago, Burlington & Northern seem to have come to no definite conclusion.

Discrimination in Issuing Passes.

John Livingston, of Campville, N. Y., who is President of the "Railway Shareholders' Association," makes a complaint before the Inter-state Commerce Commission against a large number of roads for passing delegates to the convention of the Brotherhood of Locomotive Engineers, which was held in Richmond, Va., last fall. The complainant has got hold of a copy of the resolutions by which the convention thanked 34 roads for passing delegates and their wives on credentials, 25 others for granting passes to delegates and their wives, one other for issuing passes for delegates and their families, and two others for favors not specified in the complaint, and this resolution is made the basis of a demand that the roads named be restrained from granting such free transportation and that the same be adjudged unlawful. It is claimed that many of the delegates were not at that time employees of any railroad company, and that their wives certainly were not, and were, therefore, not included in the classes excepted from the restrictive provisions of the law. Other persons traveling over the same lines at the same time were charged the usual fare, and were therefore unjustly discriminated against. It is rehearsed that members of this brotherhood were engaged in the strike on the Chicago, Burlington & Quincy, which injured the public and the railroad many million dollars; that the acknowledged motive of many of the roads for giving free transportation to these delegates is to conciliate the Brotherhood, which Brotherhood dictates wages and extorts favors by threats of strikes, and thereby does harm to the business interests of the country. The petitioner, upon information and belief, avers that a large majority of the roads of the country desire to be relieved from the importunities and threats by which this free transportation is secured.

Eastbound Grain Rates.

The Trunk Line meeting in New York city, July 11, restored the rates upon all articles of grain and its products, except corn, to the basis of 25 cents per 100 lbs., Chicago to New York, corn being left at 20 cents, to correspond with the reduction made by the Baltimore & Ohio a week before. This resolution was at once telegraphed to the Inter-state Commerce Commission, and was accepted as a legal notice from all the roads, to take effect July 22. At this time the rates by different roads were in a very mixed condition, notices of reduction to take place three days in the future, and of advances to take place ten days in future having been intermingled in a way to cause considerable uncertainty. The Grand Trunk and some other roads issued notices of reduction after the announcement of the advances, but they were to go into effect before the latter, and all to terminate on July 22. The roads east from Chicago sent separate notices to the Commission, and the advance, therefore, may take place at different dates on different roads, varying from July 21, on the Chicago & Atlantic, to July 27, on the Lake Shore & Michigan Southern.

Overland Traffic.

During the month of June 6,048 overland passengers traveled eastward over the Southern Pacific Co.'s lines. Of this number 2,555 went first class and 3,493 second class. The number of westward overland passengers was 6,919, of which number 2,608 were first class and 4,311 second class.

Transportation of Bonded Freight.

The New York, Lake Erie & Western has issued the following circular:

Commencing July 10, 1889, the following rules will govern the transportation of bonded freight:

1. By authority of the United States government, the use of lead seals on cars engaged in the transportation of United States bonded freight is discontinued, and the "Basley" Registering Lock has been substituted therefor.

2. The locks furnished for use of this company are marked "United States Customs" lettered "U," and numbered 5,856 to 6,055, inclusive, and each lock will mechanically register from 0 to 9,999, inclusive.

3. They are to be used for bonded goods only, one lock to each door of the car; these locks to be furnished by the railway company to the customs officers, who are furnished with keys by the government. The customs officers alone have authority to lock or unlock, and they alone can authorize the removal of these locks from cars.

4. In case it becomes necessary to remove, en route, one of these locks to obtain access to the car, permission must first be obtained from the superintendent, if practicable, but if, in case of accident or fire, permission cannot be obtained, locks may be broken and removed by the person in authority at the time. The broken lock, in such case, must be promptly forwarded to the superintendent, accompanied by a full report from conductor of the train or by person in authority breaking the lock. Similar information for the benefit of the customs officer, giving the cause which made it necessary to break and remove the locks, should also be made on the special manifest accompanying bonded freight shipments. Superintendents will also make a full report to this office.

5. The greatest care must be exercised by agents, trainmen and others handling cars containing bonded freight. Removal of these locks, unless by the proper authority, or as per preceding paragraph, is punishable by a fine of \$1,000 or imprisonment of five years, or both, for each offense.

6. These locks are valued at \$2.50 each. Agents using them will charge them on way-bill at the rate, or 85 per cent. They will also note on the way bill the number of each lock and the registered number shown by each when closed.

7. Agents receiving these locks will return them by express to the forwarding agent and send him the express receipt, also make out a way-bill, charging the forwarding agent with the value of them at \$2.50 each.

8. Cars containing unappraised bonded goods will be marked with a yellow card.

9. Cars containing appraised merchandise in bond will be marked with a red card.

10. An envelope has been prepared for enclosing the special manifest for United States bonded freight, and conductors, yardmasters and agents must see that this bonded manifest accompanies the car containing bonded freight in every instance. The law is imperative on this subject, and no car containing bonded freight is to be moved without this special manifest, except by permission from the superintendents.